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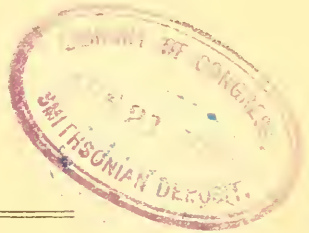




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## EXPLANATION OF THE PLATES.

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## ERRATA.

### IN THE TRANSACTIONS FOR 1878.

Page 193, line 19 (from top), for "generic" read "genetic."

### IN THE TRANSACTIONS FOR 1879.

- Page 222, line 11 (from bottom), for "Ass. K. Ins." read "Ann. K. Ins."  
 " 227, line 15 (from top), *Psychoda auriculata* should be under the heading Diptera.  
 " 331, line 28 (from top) and throughout paper, for "Potchefotroom" read "Potchefstroom."

### IN THE JOURNAL OF PROCEEDINGS FOR 1879.

- Page xix, line 6 (from top), for "*vesicatorix*" read "*vesicatoria*."  
 " xxiv, line 6 (from bottom), foot-note, for "1858" read "1878."  
 " xxxiv, line 15 (from top), for "Schœnk." read "Schœnh."

### PLATE XI.

- Fig. 4, *Leucoma vau-nigrum* is wrongly represented with an internal vein to primaries.  
 " 5, *Dasychira pudibunda*; the first branch of the median vein in the secondaries has been omitted.  
 " 8, *Gluphisia crenata*: the forking of the submedian vein must be omitted.

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1874	S. Power, Henry d'Arey, F.L.S., 3, <i>Cottage Green</i> , Camberwell, S.E.
1851	Preston, Rev. Thomas Arthur, M.A., F.L.S., <i>The Green</i> , Marlborough, Wilts.
1876	Preudhomme de Borre, Alfred, Secretary of the Entomological Society of Belgium, 19, <i>Rue de Dublin</i> , Ixelles, near Brussels.
1878	Price, David, 48, <i>West Street</i> , Horsham, Sussex.
1867	S. Pryer, H. J. S., <i>Yokohama</i> , Japan.
1870	Puls, J. C., <i>Place de la Calandre</i> , Ghent.
1872	S. Ransom, William Henry, M.D., F.R.S., <i>The Pavement</i> , Nottingham.
1874	Reed, Edwyn C., F.L.S.
1865	Reeks, Henry, F.L.S., <i>Manor House</i> , Thruaxton, near Andover, Hants.
1871	Riley, C. V., State Entomologist, <i>United States Entomological Commission</i> , Washington.
1853	Ripon, George Frederick Samuel Robinson, Marquis of, K.G., F.R.S., F.L.S., 1, <i>Carlton Gardens</i> , S.W.
1869	Robinson-Douglas, William Douglas, F.L.S., F.R.G.S., <i>Orchardton</i> , Castle-Douglas, N.B.
1877	S. Roebuck, William Denison, 9, <i>Sunnybank Terrace</i> , Leeds.
1872	S. Rothera, G. B., <i>High Street Place</i> , Nottingham.
1868	Rothney, G. A. J., <i>Calcutta</i> .
1876	† Rutherford, David Greig, F.L.S., F.R.G.S., F.Z.S., &c.
1876	† Rye, Edward Caldwell, F.Z.S., <i>Parkfield</i> , Putney, S.W.
1865	Rylands, Thomas Glazebrook, F.L.S., F.G.S., <i>Highfields</i> , Thelwall, Warrington.
1875	Sallé, Auguste, 13, <i>Rue Guy de la Brosse</i> , Paris.
1866	† Salvin, Osbert, M.A., F.R.S., F.L.S., &c., 10, <i>Chandos Street</i> , Cavendish Square, W., and <i>Brookland Avenue</i> , Cambridge.
1865	† Saunders, Edward, F.L.S., <i>Holmesdale</i> , Wandle Road, Upper Tooting, S.W.
1861	† Saunders, G. S., <i>Spencer Park</i> , Wandsworth, S.W.
*	Saunders, Sir Sidney Smith, C.M.G., <i>Gatestone</i> , Central Hill, Upper Norwood, S.E.
1865	Schaufuss, L. W., Ph. D., M. Imp., L. C. Acad., &c., <i>Dresden</i> .

Date of Election.		
1875	†	Sealy, Alfred Forbes, <i>Cochin, South India.</i>
1864		Semper, George, <i>Altona.</i>
1862		Sharp, David, M.B., <i>Eccles, Thornhill, Dumfriesshire.</i>
1847		Shepherd, Edwin.
1852		Sheppard, Edward, F.L.S., 18, <i>Durham Villas, Kensington, W.</i>
1867		Sidebotham, Joseph, <i>The Beeches, Bowdon, Cheshire.</i>
1877		Slater, John William, 18, <i>Wray Crescent, Tollington Park, N.</i>
1869		Smith, Henley Grose, <i>Warnford Court, Throgmorton Street, E.C.</i>
*	†	Spence, William Blundell, <i>Rome.</i>
1848	†	Stainton, Henry Tibbats, F.R.S., F.L.S., &c., <i>Mountsfield, Lewisham, S.E.</i>
1878		Standon, Richard S., <i>Holmwood Lodge, Surbiton, Surrey.</i>
1862		Stevens, John S., 38, <i>King Street, Covent Garden, W.C.</i>
1837		Stevens, Samuel, F.L.S., <i>Loanda, Beulah Hill, Upper Norwood, S.E.</i>
1866		Swanzy, Andrew, F.L.S., <i>Sevenoaks.</i>
1876		Swinton, A. H., <i>Binfield House, Waterden Road, Guildford.</i>
1854	S.	Thompson, Miss Sophia, <i>Barn Hill, Stamford.</i>
1856		Thomson, James, 12, <i>Rue de Presbourg, Place de l'Etoile, Paris.</i>
1838		Thwaites, George Henry Kendrick, Ph. D., F.R.S., F.L.S., Director of the Royal Botanic Garden, <i>Peradenia, Ceylon.</i>
1853	S.	Tompkins, H., 28, <i>Tavistock Square, W.C.</i>
1859	†	Trimen, Roland, F.L.S., <i>Curator of South African Museum, Cape Town, Cape of Good Hope.</i>
1869		Vaughan, Howard, 11, <i>Ospringle Road, Brecknock Road, N.W.</i>
1849		Vaughan, P. H., <i>Redland, Bristol.</i>
1866		Verrall, G. H., <i>Sussex Lodge, Newmarket.</i>
1876		Wakefield, Charles Mareus, F.L.S., <i>Belmont, Uxbridge.</i>
1879		Walhouse, Moreton J., F.R.A.S., Beng., 9, <i>Randolph Crescent, Maida Vale, W.</i>
1870		Walker, Rev. Francis Augustus, M.A., F.L.S., <i>Dry Drayton Rectory, Cambridge.</i>
1878	S.	Walker, J. J., R.N., 7, <i>West Street, Blue Town, Sheerness.</i>
1858		Wallace, Alexander, M.D., <i>Trinity House, Colechester.</i>
1863	†	Wallace, Alfred Russel, F.L.S., F.Z.S., &c., <i>Waldron Edge, Duppas Hill, Croydon.</i>
1866		Walsingham, Thomas de Grey, Lord, M.A., F.Z.S., &c., <i>Eaton House, Eaton Square, S.W.</i>
1866		Ward, Christopher, F.L.S., <i>Savile Road, Halifax.</i>
1875		Ward, Frederick Henry, <i>Springfield, Tooting, S.W.</i>
1869		Waterhouse, Charles O., <i>British Museum, W.C.</i>
*		Waterhouse, George R., F.Z.S., &c., <i>British Museum, W.C.</i>
1869		Websdale, C. G., 78, <i>High Street, Barnstaple.</i>
1845		Weir, John Jenner, F.L.S., TREASURER, 6, <i>Haddo Villas, Blackheath, S.E.</i>
1876		Western, Edward Young, 8, <i>Craven Hill, Bayswater, W.</i>
*		Westwood, John Obadiah, M.A., F.L.S., &c., Hope Professor of Zoology, <i>Walton Manor, Oxford.</i>
1868	†	White, F. Buchanan, M.D., F.L.S., <i>Perth, N.B.</i>
1865		White, Rev. William Farren, <i>Stonhouse Vicarage, Gloucestershire.</i>
1874		Wilson, Owen, <i>Cwmffrwd, Carmarthen.</i>
1878		Woodgate, John, <i>Richmond Road, New Barnet, Herts.</i>
1874		Wood-Mason, James, F.G.S., F.L.S., Curator of the Indian Museum, <i>Calcutta.</i>
1862		Wormald, Percy C., 2, <i>Clifton Villas, Highgate Hill, N.</i>
1865	S.	Young, Morris, <i>Free Museum, Paisley.</i>

# ADDITIONS TO THE LIBRARY

DURING THE YEAR

1879.

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- Abeille (L.), rédigé par M. S. A. de Marseul. Nos. 212—223. *The Editor.*
- American Naturalist (The). Vol. XII, No. 12. Vol. XIII, Nos. 2—11. 8vo. Philadelphia, 1878 and 1879. *The Editor.*
- ANDRÉ (Ed.). Species des Hyménoptères d'Europe et d'Algérie. Tome 1, fasc. 1. 8vo. Beaune, 1879. *The Author.*
- BATE (C. Spence). Catalogue of the Specimens of Amphipodous Crustacea in the Collection of the British Museum. 8vo. London, 1862. *Sir John Lubbock.*
- BERTKAU (Dr. Philipp). Bericht über die wissenschaftliche Leistungen im Gebiete der Entomologie während der Jahre 1875 und 1876. 8vo. Berlin, 1878. *Purchased.*
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- BUCKTON (G. B.). Monograph of the British Aphides (published by the Ray Society). With 86 coloured plates. 2 vols. 8vo. London, 1876 and 1879. *J. W. Dunning.*
- BURMEISTER (Hermann). Description Physique de la République Argentine. Tome 5ème, Lépidoptères. 1ère Partie contenant les Diurnes, Crépusculaires et Bombycoïdes. 8vo. Avec un Atlas de xxiv. planches in 4to. Buenos Ayres. *The Author.*
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- CHAMBERS (V. T.). Descriptions of New Tineina from Texas, and others from more northern localities. 1878. *The Author.*
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- DIMMOCK'S Special Bibliography. No. 2. The Entomological Writings of George H. Horn. Compiled by Samuel Henshaw. Edited by G. Dimmock.—No. 3. The Writings of Samuel Hubbard Scudder. Compiled and edited by George Dimmock. 8vo. Cambridge (Mass.), 1879. *G. Dimmock.*
- DISTANT (W. L.). On Hemiptera from the North-eastern Frontier of India. Parts 1 and 2. 1879. *The Author.*
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- DOUBLEDAY (E.), J. O. WESTWOOD, and W. C. HEWITSON. The Genera of Diurnal Lepidoptera: comprising their Generic Characters, a Notice of their Habits and Transformations, and a Catalogue of the Species of each Genus. By E. D. and J. O. W. Illustrated with 86 Plates, by W. C. H. 2 vols. folio. London, 1846—1852.  
*J. W. Dunning.*
- EDWARDS (William H.) The Butterflies of North America. With 50 coloured Plates. 4to. Philadelphia, 1868—1872. *The Author.*
- Entomologist (The), an Illustrated Journal of British Entomology. Edited by John T. Carrington and others. Vol. XII. 8vo. London, 1879.  
*T. P. Newman.*
- Entomologist's Monthly Magazine (The). Vol. XV., Nos. 176—180. Vol. XVI., Nos. 181—187. 8vo. London, 1879. *The Editor.*
- FISCHER (Leopold H.), Orthoptera Europæa. 4to. Lipsiæ, 1854.  
*Purchased.*
- Goss (Herbert). The Insect Fauna of the Secondary or Meozoic Period.  
*The Author.*
- GROTE (A. Robinson). Descriptions of Noctuidæ chiefly from California.  
*See also "NORTH AMERICAN ENTOMOLOGIST." The Author.*
- HEWITSON (William C.) Illustrations of Diurnal Lepidoptera. Part VIII. (and last).—Lycænidæ. *Mr. Hewitson's Executors.*
- HORN (George H.), M.D. Revision of the Bostriichidæ and Synopsis of the Colydiidæ of the United States. 1878 *The Author.*
- KIRBY (William F.) Catalogue of the Collection of Diurnal Lepidoptera formed by the late William Chapman Hewitson, and bequeathed by him to the British Museum. 4to. London, 1879.  
*Mr. Hewitson's Executors.*
- LEWIS (George). A Catalogue of the Coleoptera from the Japanese Archipelago. 8vo. London, 1879. *The Author.*
- LICHTENSTEIN (Jules) de Montpellier. Sobre las Emigraciones de los Pulgones y las Metamorfosis del Pulzon del Lentisco (*Aploneura Lentisci*). 1878. *The Author.*
- Ritsemia pupifera, eine neue Schildlaus beschrieben.
- LICHTENSTEIN (Jules) et VALÉRY MAYET. Étude sur le Gribouri ou Écrivain de la vigne (*Cryptocephalus vitis*, Geoff. Gen. *Adoxus*, Kirby). *The Author.*
- MCLACHLAN (Robert). A Monographie Revision and Synopsis of the Trichoptera of the European Fauna. Part VIII. 8vo. London and Berlin, 1879. *The Author.*
- Scientific Results of the Second Yarkand Mission; based upon the collections and notes of the late Ferdinand Stoliczka, Ph.D. (Neuroptera). 4to. Calcutta, 1878. [Printed by order of the Government of India.] *The Author.*
- MARSEUL (S. A. de). Essai Monographique sur la Famille des Histérides comprenant la Description et la Figure au Trait des Genres et des Espèces, leur Distribution Méthodique, avec un Résumé de leurs mœurs et de leur Anatomie. 8vo. Paris, 1853. *The Author.*
- Description d'Espèces nouvelles d'Histérides. 8vo. Bruxelles, 1870. *The Author.*
- Monographie des Mylabridés. 8vo. Liège, 1872. *The Author.*



- MOSLEY (S. L.) Illustrations of Varieties of British Lepidoptera: a series of Plates drawn and coloured by hand. Part IV. (*Abraxa grossulariata* and *A. ulmata*. Plants. Varieties of blackthorn, elm, and anemone). Huddersfield, 1879. *The Author.*
- MÜLLER (Albert). Remarks on Insects. [From Mitth. Schweiz. Ent. Ges. V. 1878.] *The Author.*
- Nature. Nos. 479—526 (December, 1878, to November, 1879.) *The Publishers.*
- Naturalist (The). See "SOCIETIES (HUDDERSFIELD)."
- Naturalists' Leisure Hour and Monthly Bulletin. Vol. II., Nos. 11 and 12. Vol. III., Nos. 1—3. Edited by A. E. Foote. Svo. Philadelphia, 1878—79. *The Editor.*
- North American Entomologist (The) Edited by A. R. Grote. Vol. I., Nos. 1—4. Svo. Buffalo, 1879. *The Editor.*
- OBERTHÜR (Charles). Diagnoses d'Espèces nouvelles de Lépidoptères de l'île Askold. Rennes, 1879. *The Author.*
- ORMEROD (Eleanor A.) Notes on Economic Entomology. ["Trans. Watford N. H. Soc.," 1878.] *The Author.*
- Notes of Observations of Injurious Insects. Report, 1878. Svo. London, 1879. *The Author.*
- PLATEAU (Félix). Communications Préliminaires sur les Mouvements et l'innervation de l'organe central de la circulation chez les Animaux Articulés. Svo. Bruxelles, 1878. *The Author.*
- PREUDHOMME DE BORRE (A.) Sur l'œuf et la jeune larve d'une espèce de Cyphocrania. *The Author.*
- Note sur des Difformités observées chez l'*Abax ovalis* et le *Geotrupes sylvaticus*. *The Author.*
- Quelques conseils aux Chasseurs d'insectes. 1878. *The Author.*
- Étude sur les Espèces de la Tribu des Féronides qui se rencontrent en Belgique. Ière Partie. *The Author.*
- Note sur le *Breyeria Borinensis*. 1879. *The Author.*
- De la meilleure disposition à donner aux Caisses et Cartons des Collections d'Insectes. 1879. *The Author.*
- RILEY (Charles V.) Entomological Papers. [Proc. Amer. Assoc. for Advancement of Science. 1878]
1. The Philosophy of the Movements of the Rocky Mountain Locust.
  2. A New Source of Wealth to the United States.
  3. Notes on the Life-history of the Blister-Beetles and on the Structure and Development of *Hornia*.
  4. On the Larval Characteristics of *Corydalus* and *Chauliodes*, and on the Development of *Corydalus cornutus*.
  5. Biological Notes on the Gall-making Pemphigenæ. *The Author.*
- RILEY (Charles V.) and J. MONELL Notes of the Aphididæ of the United States, with Descriptions of Species occurring West of the Mississippi. Washington, 1879. *The Authors.*
- ROUGEMENT (Dr. Philippe de). *Helicopsyche sperata* (MacLachlan). Neuchatel, 1879.
- Observations sur l'organe détonant de *Brachinus crepitans*, Oliv. *The Author.*
- SAHLBERG (C. R.) Periculum Entomographicum, Species Insectorum nondum descriptas proponens. Aboæ. *Dr. Evald Bergroth.*
- SAHLBERG (Reginaldus Ferdinandus). Monographia Geocorisarum Fenniaë. Helsingforsiaë, 1848. *Dr. Evald Bergroth.*
- In Faunam Insectorum Rossicam Symbola, novas ad Ochotsk lectas Carablicorum species continens. Helsingforsiaë. *Dr. Evald Bergroth.*

- SAUSSURE (Henri de). Mélanges Orthoptérologique. Fasc. VI., Gryllides. (2de Partie.) *The Author.*
- SCHNEIDER (J. Sparre). Enumeratio Insectorum Norvegorum. Fasc. IV. *The Royal Norwegian University in Christiania.*
- Scottish Naturalist (The). Edited by Dr. F. Buchanan White. Nos. 33—36. *The Publishers.*
- SCUDDER (Samuel H.) The Fossil Insects of the Green River Shales. Washington, 1878. *The Author.*
- SELYS-LONGCHAMPS (E. de). Quatrièmes Additions au Synopsis des Gomphines. 1878. *The Author.*
- Quatrièmes Additions au Synopsis des Calopterygiens. 1879. *The Author.*
- SEMPER (George). Auf der Insel Yap gesammelte Schmetterlinge und deren Verwandlungsgeschichte.  
Beitrag zur Rhopaloceren fauna von Australien.  
Diagnosen einiger neuer Tagfalter von dem Philippinen.  
Ueber die Arten der Tagfaltergattung *Zethera*, Felder.
- SMITH (Frederick). Descriptions of New Species of Hymenoptera in the Collection of the British Museum. 8vo. London, 1879. *The Author.*
- Societies (Transactions of Learned).
- (BRÜNN). Verhandlungen des Naturforschenden Vereines in Brünn. XVI. Band. 1877. *The Society.*
- (BRUSSELS). Annuaire de l'Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique. 1877 et 1878. 8vo. Bruxelles. *The Society.*
- Bulletin de l'Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique. Tomes XXI. à XLV. 8vo. Bruxelles. *The Society.*
- Mémoires de l'Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique. Tome XLII. 4to. Bruxelles, 1878. *The Society.*
- Mémoires Couronnés et Mémoires des Savants Etrangers. Tomes XL. et XLI. 4to. Bruxelles. *The Society.*
- Mémoires Couronnés. Tomes XXVII. et XXVIII. 8vo. Bruxelles. *The Society.*
- Annales de la Société Entomologique de Belgique. Tome XXI., Fasc. 3. Tome XXII., Trimestres I—3. 1878 et 1879. *The Society.*
- (CAMBRIDGE (Mass.), U.S.A.) Psyche, Organ of the Cambridge Entomological Club. Nos. 47—62. *The Club.*
- (CINCINNATI, U.S.A.) Journal of the Cincinnati Society of Natural History. Vol. I., No. 4. *The Society.*
- (FLORENCE). Bulletino della Società Entomologica Italiana. Anno Decimo, Trim. IV. Anno Undecimo, Trim. I.—III. Firenze, 1878—79. *The Society.*
- Catalogo della Collezione di Insetti Italiani del R. Museo di Firenze. Coleotteri. Serie 2. Firenze, 1879. *The Society.*
- (GENOA). Annali del Museo Civico di Storia Naturale di Genova. Vols. XII.—XIV. Genova, 1878—79. *The Society.*
- (GLASGOW). Proceedings of the Natural-History Society of Glasgow. Vol. II., Part 2. Vol. III., Parts 1 and 3. *The Society.*
- (HAGUE). Tijdschrift voor Entomologie. XXII. Deel. Afl. I—4. 'sGravenhage. *Dutch Entomological Society.*
- (HAMBURG). Verhandlungen des Vereines für naturwissenschaftliche Unterhaltung zu Hamburg. Von J. D. Schmeltz. *The Society.*
- (HUDDERSFIELD). The Naturalist, Journal of the Yorkshire Naturalists' Union. Nos. 42—53. *The Union.*

## Societies (Transactions of Learned).

- (LONDON). Proceedings of the Royal Society. Nos. 190—197. *The Society.*  
 Journal of the Linnean Society (Zoology). Nos. 77—80. *The Society.*  
 Transactions of the Linnean Society of London. 2nd Series (Zoology).  
 Vol. I., Part 8. *The Society.*  
 List of Members of the Linnean Society of London. *The Society.*  
 Proceedings of the Scientific Meetings of the Zoological Society of  
 London. 1878, Part 4. 1879, Parts 1—3. *The Society.*  
 Journal of the Quekett Microscopical Club. Nos. 39 and 40.  
*The Club.*  
 Journal of the Royal Microscopical Society. Vols. I. and II. 1878—9.  
*The Society.*
- (MOSCOW). Bulletin de la Société des Naturalistes de Moscou. 1878,  
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- (PHILADELPHIA). Smithsonian Miscellaneous Collections. Vol. XIV.  
 [Containing "Synopsis of American (Solitary) Wasps," by H. de  
 Saussure.] Vol. XV. [Containing "Enquiries relative to the  
 Natural History of the American Crawfish and the Fresh-water  
 Crustacea of North America."] *The Smithsonian Society.*
- (ST. PETERSBURG). Horæ Societatis Entomologiæ Rossicæ. T. XII.,  
 Nos. 2 and 3. T. XIII. Petropoli, 1876—77. *The Society.*  
 Transactions of the Russian Entomological Society of St. Petersburg.  
 T. X. [In the Russian language.] *The Society.*
- (SCHAFFHAUSEN). Mittheilungen der Schweizerischen Entomologischen  
 Gesellschaft. Vol. IV., Heft. 3. Vol. V., Heft. 1, 2, 7, and 8.  
*The Society.*
- (STETTIN). Entomologische Zeitung. 39 Jahrgang, Nos. 10—12. 40 Jahr-  
 gang, Nos. 1—12. 1879. *The Society.*
- (SYDNEY). Proceedings of the Linnean Society of N. S. Wales. Vol. III.,  
 Parts 2—4. *The Society.*
- (TOULOUSE). Bulletin de la Société d'histoire naturelle de Toulouse.  
 11ème année, Fasc. 2. 12ème année, Fasc. 3. 13ème année, Fasc. 1.  
*The Society.*
- (VIENNA). Verhandlungen der k. k. zool. botan. Gesellschaft. XXVIII.  
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- (WASHINGTON). United States Geological and Geographical Survey of the  
 Territories. Vol. IV., No. 4. Washington, 1878.  
*Prof. F. V. Hayden.*  
 Tenth Annual Report of the United States Geological and Geographical  
 Survey of the Territories. Washington, 1878. [Containing  
 "Report of A. S. Packard, jun., on Insects affecting the Cranberry,  
 with remarks on other Injurious Insects."] *Prof. F. V. Hayden.*  
 Bulletin of the United States Geological and Geographical Survey of  
 the Territories. Vol. V., No. 1. *Prof. F. V. Hayden.*
- (WARWICK). Proceedings of the Warwickshire Naturalists' and Archæolo-  
 gists' Field Club. 1878. *The Club.*
- (WATFORD and HERTFORD). Transactions of the Watford Natural History  
 Society and Hertfordshire Field Club. Vol. II., Parts 2—5.  
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- (WELLINGTON, New Zealand). Transactions of the New Zealand Institute,  
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 [Containing Supplementary Description of Species or Varieties of  
 Chrysophani (Lepidoptera-Rhopalocera) inhabiting New Zealand.  
 By R. W. Fereday.  
 Description of New Genera and Species of Psychidæ. By  
 R. W. Fereday.  
 On the Butterflies of New Zealand. By Arthur G. Butler.]

## Societies (Transactions of Learned).

Notes on the Metamorphosis and Development of one of our large Butterflies (*Danais berenice*), or a closely-allied Species. By W. Colenso.

On a new Species of Trap-Door Spider from New Zealand. By the Rev. O. P. Cambridge.

Notes on the New Zealand Myriapoda in the Otago Museum. By Prof. F. W. Hutton.

Notes on a Marine Spider found at Cape Campbell. By C. H. Robson.

Description of Trap-Door Spiders' Nests from California and from Western Australia in the Christ Church Museum. By R. Gillies.

Notes on some Changes in the Fauna of Otago. By R. Gillies.]

VILLA (Giovanni Battista). *Passagio di Farfalle*. Milano, 1879.

*The Author.*

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WALKER (Rev. F. A.). *Addenda to the History of the Parish of Dry Drayton*.

*The Author.*

Catalogue of Japanese Insects presented to Highgate School by William Ford, Esq.

*The Author.*

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*The Author.*

WILSON (C. A.). *The Life and Works of Alfred R. Wallace*, by Delta Adelaide. [From 'The Garden and the Field.']

*The Author.*

WOLLASTON (Mrs. T. V.). *Notes on the Lepidoptera of St. Helena, with Descriptions of New Species*. 8vo. London, 1879.

*The Author.*

WOOD-MASON (Professor James). *Entomological Notes*:

1. On the differences in the form of the Antennæ between the males of *Idolomorpha* and those of the Genera of Empusidæ, a sub-family of Mantidæ.

2. On the presence of a stridulating apparatus in certain Mantidæ.

3. On a Saltatorial *Mantis*.

4. On the hatching period of Mantidæ in Eastern Bengal.

*The Author.*

Notes on Phasmidæ.

*The Author.*

Description of a new Lepidopterous Insect belonging to the Genus *Thaumantis*.

*The Author.*

WOODWARD (Henry). *A Catalogue of British Fossil Crustacea, with their Synonyms, and the Range in Time of each Genus and Order*. 8vo. London, 1877.

*Sir J Lubbock.*

Zoologist (The) for 1879.

*T. P. Newman.*

Zoological Record for 1877. Vol. XIV.

*Purchased.*





THE  
TRANSACTIONS  
OF THE  
ENTOMOLOGICAL SOCIETY  
OF  
LONDON  
FOR THE YEAR 1879.

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I. *On a Collection of Lepidoptera from Cachar, N. E. India.* By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Read December 4th, 1878.]

THE following series of *Lepidoptera* has recently been received from Mr. William Grant, who collected the whole of them in the immediate vicinity of his bungalow on the Burtoll Tea Estate at Cachar. Eight of the species are new.

Among the Butterflies the most interesting are a fine pair of *Salpinx splendens*—a species hitherto very rare in collections, a new species of the same genus, a series of *Stictoplaea binotata*, a pair of *S. microsticta*, and one or two less brilliant but rare species of *Neptis* and *Mycalesis*. Among the Moths are several good species belonging to the genera *Macroglossa*, *Leucophlebia*, *Syntomis*, *Eternusia*, *Attacus* and *Hypocala*, one or two of them being new to science.

The following is a list of the species:—

RHOPALOCERA.		
Salpinx radamanthus, Fabr.		Stictoplaea binotata, Butler.
„ splendens, Butler.		„ microsticta, Butler.
„ Grantii, n. sp.		Danaüs septentrionis, Butler.
Trepsichrois midamus, Linn.		„ limniäce, Cram.
Euplaea alcathoë, Godt.		„ aglea, Cram.
		„ plexippus, Linn.
		„ chrysiippus, Linn.

Melanitis Leda, Linn.	Papilio Sarpedon, Linn.
"    ismene, Cram.	"    erithonius, Cram.
Mycalasis mineus, Linn.	"    polytes, Linn.
"    blasius, Fabr.	"    diphilus, Esper.
"    lurida, n. sp.	"    Doubledayi, Wallace.
Ypthima Hübneri, Kirby.	Hesperia exclamatoris, Fabr.
Elymnias leucozyma, Godt.	Astictopterus diocles, Moore.
"    undularis, Drury.	Plesioneura folus, Cram.
Thaumantis canadava, Westw.	
Athyma leucothoë, Linn.	
Neptis miah, Moore.	
"    Cacharica, n. sp.	
Ergolis Ariadne, Linn.	
"    merione, Cram.	
Junonia asterie, Linn.	
"    zenone, Linn.	
"    lemonias, Linn.	
"    laomedea, Linn.	
Adolia lepidea, Butler.	
"    sedeva, Moore.	
Euripus halitherses, Westw.	
Hypolimnas bolina, Linn.	
Cethosia cyane, Drury.	
"    biblis, Drury.	
Lampides bætica, Linn.	
Lycæna squalida, n. sp.	
Loxura atymnus, Cram.	
Amblypodia camdeo, Moore.	
Delias pasithoë, Linn.	
Terias æsiopæ, Ménétr.	
Terias hecabeoides, Ménétr.	
Catopsilia pyranthe, Linn.	
"    chryseis, Drury.	
"    catilla, Cram.	
"    crocale, Cram.	
Synechloë gliciria, Cram.	
Papilio Alcibiades ? Fabr.	
	Macroglossa nigrifasciata, Butler.
	Charocampa lineosa, Walker.
	Acherontia styx, Westw.
	Leucophebia lineata, Westw.
	Syntomis artina, Butler.
	"    sargania, n. sp.
	Areas lactinea, Cram.
	Nyctemera lactinea, Cram.
	Euschema militaris, Linn.
	Eterusia magnifica, n. sp.
	Numenes siletti, Walker.
	Attacus obscurus, n. sp.
	Anzabe sinensis, Walker.
	Nemeta bifacies, Walker.*
	Anophia olivescens, Guén.
	Hypocala violacea, n. sp.
	Ophideres fullonica, Clerck.
	"    hypermnestra, Cram.
	Patula macrops, Linn.
	Argiva hieroglyphica, Drury.
	Nyctipao truncata, Moore.
	"    lætitia, Butler.
	Achæa melicerte, Drury.
	Agathodes ostentalis, Hübn.
	Margaronia conchylalis, Guén.
	"    maliferalis, Walker.
	Hyponomenta Assamensis, n. sp.

## HETEROCERA.

## RHOPALOCERA.

*Salpinx Grantii*, n. sp.

♀. Primaries above rich piceous brown, shot with purple, darkest in the centre and palest at external angle, a small white subcostal spot just above the end of the cell, a crescent-shaped lilac spot in the cell, a circular spot on the first median interspace, two fusiform spots beyond the cell, and a series of seven spots, the sixth pyriform, parallel to the outer margin: all these spots lilac with white centres, an ill-defined lilac spot on the second median interspace, a submarginal series of eight white dots between the lower radial and the external angle. Secondaries piceous

\* The locality of this species is wrongly given as Brazil; it should probably be Bengal: it is a *Limacodid* (not a *Psychid*).



brown, faintly shot with purple, the costal and external areas broadly paler, two series of pale brown spots parallel to the outer margin, the first of the inner series white-centred, costal border whitish; wings below olive-brown, the primaries with the median area suffused with piceous, inner border whitish, a pinky-white subcostal spot and three in an increasing oblique series above each of the median veins, three or four scattered white dots in an interrupted discal series parallel to the outer margin, and six rather larger white dots in a submarginal series between the lower radial and the external angle; secondaries with several white dots at the base, a discal series of ten white spots, the upper three rounded, in an oblique subapical series, the remainder rather elongated and parallel to the outer margin, nine white submarginal dots between the radial and the anal angle: expanse of wings 3 inches 11 lines.

This species may readily be distinguished from *E. splendens*, ♀, by the greater width and less brilliant purple (not blue) shot of the primaries, also in the more numerous submarginal spots of the primaries, the inner series being, moreover, larger and lilac, whereas in *S. splendens* they are pure white with pale violet borders; the discoidal spot not present on the undersurface, but an additional spot beyond the cell, the other spots smaller; no lilac dots beyond the cell of secondaries. Before the present collection arrived I supposed an example of *S. Grantii* in the Museum Cabinet to be *S. splendens*, ♀, thinking that the differences in colour and marking were due to sex.

*Mycalesis lurida*, n. sp.

♂. Allied to *M. lalassis*, but the basal half of the primaries, both above and below, suffused with lurid ochraceous; the white stripe of the undersurface reduced to a slender brown-edged squamose white line; the third of the four ocelli of primaries reduced in size, and only the two first united: expanse of wings 1 inch 8 lines.

*Neptis cacharica*, n. sp.

♀. Allied to *N. adipala* (P. Z. S. 1872, pl. 32, fig. 8), but of a more rufous-brown colour, the three oblique spots beyond the cell more elongated or less widely separated, the oblique series below the cell, near external angle, also more elongated, the first two being only separated by

the internal vein; the oblique white dashes beyond these spots replaced by a regular lunulated pale brown stripe; the submarginal lunules more regular, with black internal borders; the inner belt of secondaries wider and more incurved towards the costa; the outer belt farther from the outer margin, consisting of seven, instead of six spots; the pale brown submarginal stripe narrower and farther from the margin; wings below golden-brown, with white bands, stripes and spots as above, excepting that the lunular submarginal series of primaries and the discal macular belt of secondaries are wider, with their divisions less distinctly separated; two whitish stripes close to the outer margin, interrupted upon the primaries by a patch of the ground-colour upon the second median interspace, the outer one diffused and interrupted a second time at apex, the inner stripe of primaries interrupted by the veins; the undulated pale brown lunulated stripe of the upper surface replaced by a whitish stripe; base of costa orange; secondaries with the base, a subcostal streak near the base, and a nearly straight stripe through the second brown belt (beyond the broad white belt), whitish; body below white; tibiæ and tarsi of second and third pairs of legs testaceous: expanse of wings 2 inches 3 lines.

A well-marked form of this puzzling group, quite distinct from any named species in Mr. Moore's collection or that of the British Museum.

*Lycæna squalida*, n. sp.

Allied to *L. Karsandra*, much larger; above greyish-brown, primaries sprinkled with lilac scales towards the base; body blackish, antennæ with white annulations; wings below sordid white, with black spots, bordered with pure white, arranged as in *L. Karsandra* and allies, but the discal series of primaries less arched and smaller; a submarginal series of stone-grey spots, and in front of them a series of lunules of the same colour: expanse of wings 1 inch.

HETEROCERA.

*Syntomis sargania*, n. sp.

Allied to *S. libera*; wings hyaline-white, with black veins and margins; primaries with the base, a broad belt just beyond the middle, throwing a projecting streak back-

wards below the median vein (so as almost to fill up the first median interspace), and a second outwards between the radials, and the apex black; secondaries with very broad black outer border; body black, with a slight greenish tint; the frons, collar, a line across the meta-thorax and two belts across the abdomen, one basal and the other subanal, bright ochreous; wings below as above; body black, anterior coxæ, and a subanal belt across the venter bright ochreous: expanse of wings 1 inch 3 lines.

One female.

*Eterusia magnifica*, n. sp.

♀. Allied to *E. tricolor* and *E. adæa*; primaries dark purplish chocolate-brown, crossed before the middle by a broad irregular yellowish-white belt, interrupted by ultramarine streaks upon the nervures; a dash across the base, a large spot at the end of the cell, two spots and a dash between them crossing the lower half of the disc, and an irregularly-bisinated subapical belt, divided by the nervures into seven more or less ovoid spots, white; the discal spots with pale blue internal borders; secondaries black, crossed in the centre by a very broad externally angulated bright ochreous belt which unites with a white costal streak running to the base; base, apex, outer border and veins beyond the ochreous belt brilliant metallic cobalt-blue; two small spots beyond the cell, and two between the second and fourth median branches, white; thorax dark brown, the main stem of the antennæ, crest, two spots at the back of the collar in the centre, the tips of the tegulæ, meta-thorax and two basal segments of the abdomen, blue, changing in certain lights to green; internal angles of tegulæ white; remaining segments of abdomen yellow, with lateral black dots; wings below nearly as above, but the white spots tinted with sulphur-yellow, all the veins blue-bordered; body below dark green, legs brown; coxæ white spotted; segments of venter white-edged: expanse of wings 2 inches 10 lines.

There is a series of this species in Mr. Moore's collection.

*Attacus obscurus*, n. sp.

Allied to *A. lunula* from Silhet, but much larger, darker than any of the described species, the white central belt of primaries much narrower and succeeded by a broad ashy-grey (not sordid pink) belt, not inarched but angu-

lated; the maggot-like spot of primaries as long as in *A. vesta*; the disc of all the wings blackish-olivaceous; internal border of primaries, towards the external angle, clay-coloured; collar pale testaceous, with whitish posterior border; secondaries much produced at anal angle: expanse of wings 4 inches 8 lines to 5 inches 7 lines.

One male and three females. There are also specimens in Mr. Moore's collection.

*Hypocala violacea*, n. sp.

Allied to *H. deflorata*, much larger; primaries ferruginous, shot with violet, striolated with blackish, a pale patch at apex, a large quadrate patch at the end of the cell and the outer border not shot with violet, a small black-centred greenish ocellus near external angle, fringe brown; secondaries black-brown, becoming smoky-brown near the costa, costal border sericeous white, pale spots and streaks nearly as in *H. deflorata*, but bright orange and all separate, fringe red-brown, becoming ochreous at anal angle; thorax red-brown, speckled with black, and with a faint lilac gloss; abdomen black, banded with orange; anal tuft brown, orange at the base; primaries below ochreous, with pale internal area, costal and external borders and apex brownish clay-colour speckled with black, two abbreviated black belts, the first central, the second discal; secondaries ochreous, with the costa and apical half brownish clay-colour, striolated with blackish; a black spot at the base of the median branches, and an oblique abbreviated black belt from the second median branch to the anal angle; pectus and base of venter whitish speckled with blackish, remainder of venter red-brown, gradually increasing in intensity to the extremity and speckled with black: expanse of wings 1 inch 10 lines.

Two examples. If there were any doubt as to this being distinct from highly-coloured and large examples of *H. deflorata*, the pattern of the undersurface would at once decide their entire distinctness.

*Hyponomeuta Assamensis*, n. sp.

Primaries sericeous greyish-brown, two black divergent basal streaks; a long black streak divided in the centre by the discocellulars; a black streak below the cell, and below it three large black spots nearly in a line; a black internal

spot near the base; four or five short black subcostal dashes above the end of the cell; one or two black spots on the median interspaces, and three or four marginal black spots towards the external angle; secondaries shining grey; thorax greyish-brown, spotted with black; abdomen orange; wings and pectus below silvery-greyish; venter orange: expanse of wings 1 inch 2 lines.

A single example, slightly rubbed; it comes nearer to *H. confusellus* than to any other described species.

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*Remarks on local Variations of certain Species.*

*Stictoplaea microsticta.*

The specimens are much dwarfed, and may prove to be locally constant in their differences.

*Athyma leucothoë.*

The examples vary much in the width of the white belt across the secondaries.

*Neptis miah.*

The specimen sent has the pale lines intersecting the central band and border of secondaries below distinctly undulated.

*Junonia asterie.*

Varies considerably in the intensity of the white belt on the undersurface.

*Terias asiopæ.*

One female has the border of primaries less deeply sinuated than usual.

*Terias hecabeoides.*

One of the specimens is unusually large.

*Catopsilia pyranthe.*

The examples are referable to the broad-bordered form of the species.

*Catopsilia chryseis.*

The variety *C. nephte*, Fabr., is represented at Cachar.

*Papilio Aleibiades.*

The male example in the Collection agrees with Bornean examples, and may prove to be referable to a distinct though allied species.

*Papilio Doubledayi.*

The veins more heavily black-bordered than usual.

*Chærocampa lineosa.*

Smaller and more olivaceous than usual.

II. *Descriptions of the species of the Lepidopterous genus Kallima.* By FREDERIC MOORE, F.Z.S.

[Read February 5th, 1879.]

KALLIMA, Westwood, Doubleday and Hewits., D. Lep. p. 324 (1850); Felder, Neues Lep. p. 14 (1861).

Group I. *With oblique band fulvous in male, bluish-white in female.*

KALLIMA PARALEKTA.

*Paphia Paralekta*, Horsfield, Catal. Lep. E. I. C. pl. 6, f. 4 ♂ (1829).

Male. Forewing with an oblique uniformly narrow fulvous band, its inner border terminating at posterior angle; basal area and hindwing deep blue. Female, with bluish-purple white band; basal area and hindwing dark rufous-brown; discal hyaline spot in both sexes small and oval.

Exp.  $3\frac{7}{8}$  ins.

*Hab.*—Java (Horsfield Coll.).

KALLIMA HEWITSONI, n. sp.

*Kallima Paralekta*, Doubleday and Hewitson, Diurnal Lep. pl. 52, f. 3 ♀ (1850).

Female. Similar to *K. Paralekta*, differing in the shape of the bluish-purple white band and absence of the discal hyaline spot.

Exp. 4 ins.

*Hab.*—Himalaya. In Coll. late W. C. Hewitson.

Although the "Himalaya" is given by Doubleday and Hewitson (l. c. p. 325) as the locality of this species, I doubt its correctness. There is no locality label on the type specimen.





above; the forewing is less angled on the hindward part of the exterior margin, the apex being more produced in the male and less so in the female; the discal hyaline spot small and almost circular; the hindwing also is less convex on the exterior margin and has a much shorter tail. Underside luteous-brown, purple tinted, and rufous speckled, brightest in female; rib and basal lines indistinct in male.

Exp. ♂  $3\frac{3}{4}$ , ♀ 4 ins.

*Hab.*—Upper Tenasserim. In Coll. Brit. Mus. and F. Moore.

### KALLIMA INACHIS.

*Paphia Inachus*, Boisd. Crochard's Edit. Cuv. Règ. Anim. Ins. II. pl. 139, fig. 3 (1836), ♀.

A large, dark, bright violet-blue, prominently-marked species; the forewing with broad fulvous band extending to outer margin; the outer borders of hindwing paler and prominently marked with short brown strigæ. Forewing with a short apical point in male and a very prolonged one in female; discal hyaline spot larger than in the other species. Underside ochreous-brown, vinous tinted, minutely brown speckled; rib line indistinct.

Exp. ♂  $3\frac{2}{8}$ , ♀  $3\frac{7}{8}$  ins.

*Hab.*—Sikkim Himalayas. In Coll. F. Moore.

Dr. Boisduval gives Nepal as the habitat of the species which he figures as above. This is doubtless an error.

### KALLIMA BUCKLEYI, n. sp.

Compared with its nearest ally (*K. Inachis*) this species has quite a different appearance, the male being of larger size than the same sex of that species; outline of wings similar; forewing with a shorter and broader fulvous band than in any of the other species, the discal spot blind (having no hyaline centre) in the male, and present only as a minute slender one in the female; basal area and the hindwing of a uniform greyish-blue. Underside of male dusky purple-brown; bright reddish-brown in female, with greyish-purple sinuous fasciæ; rib line indistinct in male.

Exp. ♂ ♀ 4 ins.

*Hab.*—N. W. Himalaya. In Coll. F. Moore.

## KALLIMA HÜGELI.

*Paphia Hügelii*, Kollar; Hügel's Kasch. iv. p. 432,  
pl. 9 (1844).

*Kallima Inachis*, Westw. in Royle's Himalayan Bot.  
pl. 10, f. 3; H. Schæff. Exot. Schmett. f. 7, 8 (1852).

May be at once distinguished by the very pale grey-blue colour of the basal area of forewing and the hindwing. Forewing of female with less prolonged apex than in *K. Inachis*. Underside greyish-ochreous, of uniform tint throughout; frequently black mottled; rib line indistinct.

Exp. ♂  $3\frac{3}{8}$ , ♀  $3\frac{1}{8}$  ins.

*Hab.*—N. W. Himalaya; Cashmere. In Coll. F. Moore.

## KALLIMA RAMSAYI, n. sp.

Distinguished by its very dark and prominent markings: forewing with short sharp-pointed apex; the upper or apical border of fulvous band very irregular; the outer marginal parallel sinuous line very prominent; a single large discal hyaline spot; basal area and hindwing very dark iron-grey blue; female with the exterior margin of forewing more convex hindward and at posterior angle, and the exterior border of hindwing fulvous-brown. Underside chestnut-brown, sparsely speckled, and with pale ochreous fasciæ; rib line prominent.

Exp. ♂ ♀  $3\frac{3}{8}$  ins.

*Hab.*—Nepal, District of Katmandu (Gen. Ramsay). In Coll. F. Moore.

## KALLIMA HUTTONI, n. sp.

Distinguished by the forewing being truncated exteriorly and the apex not prolonged; fulvous band narrow and continued to the marginal angle, its upper or apical border less undulated being nearly even in some specimens; basal area and hindwing bright deep dusky vinous blue, discal hyaline spot minute. Underside deep chestnut-brown, with greyish-purple fasciæ; rib line prominent.

Exp. ♂ ♀  $3\frac{2}{8}$  ins.

*Hab.*—Mussoorie, N. W. Himalaya (Capt. T. Hutton). In Coll. F. Moore.

## KALLIMA BOISDUVALI, n. sp.

Of smaller size than the other species here described: forewing truncated and blunt-pointed at apex; fulvous

band narrow, its inner angular border broadly black; discal hyaline spot small but prominent; basal area and hindwing uniformly blue. Underside ochreous-brown, numerous covered with dark-brown speckles and strigæ; rib and basal transverse lines very prominent.

Exp.  $2\frac{7}{8}$  ins.

*Hab.*—Kussowlee, N. W. Himalaya. In Coll. F. Moore.

Group III. *With oblique band white in both sexes.*

KALLIMA ALBOFASCIATA.

*Kallima albofasciata*, Moore, P. Z. S. 1877, p. 584.

Both sexes with a prominent cream-white narrow band, large apical spot, and a dark-bordered hyaline discal spot; basal area and hindwing greyish indigo-blue. Underside greyish-ochreous, sparsely brown speckled; rib line prominent.

Exp.  $3\frac{2}{8}$  ins.

*Hab.*—S. Andamans. In Coll. F. Moore.

Group IV. *With oblique band blue in both sexes.*

KALLIMA HORSFIELDI.

*Paphia Horsfieldi*, Kollar; Hügel's Kasch. iv. p. 431, pl. x. ♀.

This species has a prolonged apex to the forewing, a broad oblique bluish-white band, and is without the discal hyaline spots; base of wings very pale blue, the outer border of hindwing greenish-ochreous. Underside ochreous, with greenish-ochreous fasciæ.

Exp.  $3\frac{4}{8}$  ins.

*Hab.*—N. W. Himalaya (Hügel).

I have not yet seen specimens of this species from the locality given by Hügel, but I possess a specimen of what I doubtfully take to be the same from the collection of the late Dr. Leith, which he stated was captured in Belgaum (2,260 feet, W. Ghauts of S. India). Specimens have also been taken by Mr. Newton and Dr. Smith on the Matheran Hill, near Bombay.

## KALLIMA MACKWOODI, n. sp.

Upperside pale indigo-blue, the band on forewing very pale in male, almost white in female. Both sexes with two prominent hyaline discal spots, the lower spot large. Underside greenish-grey, with brown transverse band and outer purplish fasciæ. Underside greenish-ochreous, brown speckled, purplish fasciæ, and prominent brown rib line.

Exp. ♂  $3\frac{1}{8}$ , ♀  $3\frac{2}{8}$  ins.

*Hab.*—Ceylon. In Coll. F. M. Mackwood and F. Moore.

## KALLIMA DOUBLEDAYI, n. sp.

Smaller than *K. Mackwoodi*. Male: of a dark dull greenish-grey, the band on forewing paler, with two hyaline spots. Female, greyish-cyaneous, the band also paler than in *K. Mackwoodi* and without hyaline spots. Underside dull ochreous-brown, markings dark sap-brown.

Exp. ♂  $3\frac{1}{8}$ , ♀  $3\frac{3}{8}$  ins.

*Hab.*—Scind Hills, N. W. India. In Coll. of Brit. Mus.

## KALLIMA ALOMPRA, n. sp.

Male. Has most the appearance of *K. Doubledayi* from Scind. Differs in being darker, the band also of a darker and different tint, and the male has only a minute hyaline lower discal spot, which is slightly more apparent in the female. Underside greenish-brown, tinted with purple; rib line prominent, dark brown.

Exp. 3 ins.

*Hab.*—Burmah. In Coll. F. Moore, and late W. C. Hewitson.

## KALLIMA WARDI, n. sp.

Distinguished by having a narrow blue band which crosses the wing more erect than in any other species, and the outer black border extends broadly to posterior margin; it has two oval discal hyaline spots: base of wing and hindwing of a greenish tint, outer border of the latter brownish. Underside dark vinous-brown, grey tinted basally.

Exp.  $3\frac{1}{8}$  ins.

*Hab.*—Calicut, Malabar Coast (Coll. S. N. Ward). Also taken at Coonoor by Mrs. Godfrey Clerk.

KALLIMA PHILARCHUS.

*Amathusia Philarchus*, Westwood, Cabinet of Oriental Entom. p. 56, pl. 27, f. 4 (1848).

Differs from *K. Mackwoodi* in the basal area and the hindwing being of a deep, dusky steel-blue colour, and in the absence of the discal hyaline spots.

Exp. 3 $\frac{1}{2}$  ins.

*Hab.*—Ceylon. In Coll, F. Moore.



III. *Description of a new genus and species of Rhyncophorous Coleoptera allied to Sipalus found in an orchid house.* By CHAS. O. WATERHOUSE.

[Read February 5th, 1879.]

THE species which I describe in this note was exhibited at the December meeting of this Society. The specimen, as I then stated, was found alive by Mr. J. C. Bowring, in his orchid house at Windsor. It is impossible to say from what locality it was imported, but it was, no doubt, from some part of India, as Mr. Pascoe possesses a specimen of the same species in his collection from Ceylon.

I propose to adopt the manuscript name attached by Mr. Pascoe to his example, viz., *Nassophasis foveata*.

NASSOPHASIS, gen. n.

General form that of *Sipalus*, but narrower and slightly compressed, with an exposed pygidium, and finely granular eyes. Rostrum as in *Sipalus granulatus*, but rather more curved, with the mouth of *Rhyncophorus*. Antennæ inserted near the base of the rostrum, the funiculus with six joints, the 2nd distinctly longer than the 1st, the 3rd to 6th transverse; the club about twice as long as broad, compressed, shining, a little narrower at the base than before the apex; the apex spongy. Thorax subcylindrical, constricted within the apex, bisinuate at the base. Scutellum small, elongate ovate. Elytra moderately convex, a little broader than the thorax, somewhat compressed at the sides, declivous at the apex, leaving the pygidium exposed. Anterior coxæ globular, contiguous; intermediate coxæ slightly separated; posterior coxæ widely separated. Legs as in *Sipalus*; tarsi of *Rhyncophorus*, the 3rd joint broadly cordiform, spongy beneath.

The characters may be exhibited thus:—

<i>Sipalus.</i>	<i>Rhyncophorus.</i>
Form and appearance.	Eyes finely granular.
Scutellum small.	
Rostrum.	Mouth pit.
Underside of the body.	
Legs.	Tarsi.
Pygidium (in form).	Pygidium, exposed.

From these characters it will be seen that this genus should be placed near *Sipalus*, and between it and *Rhyncophorus*.

*Nassophasis foveata.*

Atra, opaca; thorace foveato-punctato, guttâ medianâ albâ; elytris seriatim foveato-punctatis, guttis nonnullis circa humeris fasciâque angustâ subapicali albis.

Long.  $4\frac{3}{4}$  lin.

Thorax a little longer than broad, constricted within the apex, rather straight at the sides, a trifle narrower towards the base, the whole upper surface covered with deep foveæ, which leave narrow intervals; there is a small whitish spot on the disk, a little white at the sides. Elytra rather broader than the thorax, a little narrowed posteriorly, convex (but flattened at the sutural region), with lines of large, deep, elongate foveæ, which leave the narrow intervals elevated; there are some half-dozen whitish spots placed round the shoulders, and a little before the apex a whitish fascia, slightly ascending at the suture. Pygidium trapeziform, with some deep punctures.

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To-day, Mr. Bowring brought to the British Museum three living specimens of this species, which he had taken on an orchid (*Aërides Fieldingii*) received from the Khasia Hills. March 18th, 1879.



- IV. *On the Lepidoptera of the Amazons, collected by Dr. JAMES W. H. TRAIL, during the years 1873 to 1875.* By ARTHUR GARDINER BUTLER, F.L.S., F.Z.S., &c.

[Read February 5th, 1879.]

### PART III.—NOCTUITES.

DR. TRAIL obtained 149 species of *Noctuities* during his expedition up the Amazons, but four of these were not in a sufficiently perfect condition for identification; so that the number may be reckoned as 145, of these species no less than 55 are forms new to science.

Owing to the recklessness with which some authors have characterized genera in this tribe, I have been saved the necessity of describing any; but, at the same time, this recklessness has caused so much confusion in the identification and location of species, that hardly a genus of the New World *Noctuities* exists which does not need more or less revision.

#### Family BOMBYCOIDÆ.

##### MICROCÆLIA, *Guénée*.

###### 1. *Microcælia discincta*, n. sp.

Primaries above whity-brown, feebly mottled with clay colour; external fourth, excepting at apex, chocolate-brown, crossed internally by an ill-defined series of small tawny spots, and limited by a brown-edged transverse whitish discal line; discoidal spots ill-defined, greyish with pale margins; a tapering subbasal streak, an oblique dash near the centre of the costal area and a cuneiform costal spot beyond the cell chocolate-brown; two parallel bisinuated brown lines from the cell to the inner margin; a marginal series of whitish-edged black dots; fringe pale brown, spotted with dark brown; secondaries sericeous smoky-brown, paler towards the base; fringe whitish, traversed by an ill-defined brown line; head and thorax

white ; collar reddish ; abdomen whitish-brown ; primaries below greyish-brown, with a pink gloss, borders whitish-brown, speckled with darker brown ; costal border towards apex red-brown, with four whitish costal dots ; secondaries whitish, speckled with brown and with a pinkish-brown diffused discal band ; marginal line of all the wings black and undulated ; body whitish : expanse of wings 1 inch 3 lines.

Rio Trombetas, near the Falls, 28th February, 1874.

### Family LEUCANIIDÆ.

#### LEUCANIA, *Ochsenheimer*.

#### 2. *Leucania antica*.

*Leucania antica*, Walker, Lep. Het. ix. p. 100, n. 52 (1856).

Curimatá, Rio Juruá, 30th October ; Pupunha, 4th to 6th November, 1874.

#### 3. *Leucania dorsalis*, var.

*Leucania dorsalis*, Walker, Lep. Het. ix. p. 98, n. 43 (1856).

Aveyros, Rio Tapajos, 11th March, 1874.

### Family GLOTTULIDÆ.

#### GISCALA, *Walker*.

#### 4. *Giscala quadricolor*.

*Giscala quadricolor*, Walker, Lep. Het. xv. p. 1672, n. 1 (1858).

*Ceroctena pictipennis*, Felder, Reise der Nov. Lep. iv. pl. cxix. fig. 3 (1874).

Rio Javary, 3rd December, 1874.

### Family XYLOPHASIIDÆ.

#### PROMETOPUS, *Guénéé*.

M. Guénéé says of this genus : “ Il faudrait connaître de ce genre curieux pour lui assigner une place définitive. L’insecte parfait offre une assez grande analogie avec les

*Diptera*, dont il diffère, du reste, beaucoup par son organisation, ainsi qu'on pourra s'en convaincre par les caractères ci-dessus. Peut-être devra-t-il se placer dans les *Notodontidæ*, quoiqu'il ait bien l'aspect d'une *Noctuelle*."

Walker adds: "This genus resembles some of the *Notodontidæ*, and, like some others, may be removed from the *Hypogrammidæ*, but does not well agree with the characters of any other family of *Noctuites*."

After reading the above, I find it very difficult to point out characters by which *Prometopus* may readily be distinguished from *Xylophasia*, but the discocellulars do seem to be rather less angulated.

##### 5. *Prometopus assuetus*, n. sp.

Extremely like *Xylophasia sodalis*, from Japan. Primaries whity-brown, clouded with greyish-brown and with black markings, much as in *X. rurea*, but more defined, a large additional subapical black spot near the costa; secondaries sericeous cupreous-brown, brightest and darkest on external area; costal margin white; fringe whitish, spotted with purplish-brown; body whity-brown; collar and tegulæ rosy-greyish, traversed by arched black lines; undersurface coloured much as in *X. hepatica*, but even darker in colour, the blackish discal line still more irregular; body whitish: expanse of wings 1 inch 6 lines.

Boa Vista, Rio Purus, 12th September; Pupunhazinho, Rio Juruá, 8th November, 1874; Rio Jutahi, 20th January, 1875.

##### 6. *Prometopus ordinarius*, n. sp.

Most like *Xylophasia verbascoides*, but, in marking, still more like the species of *Lithophane*; primaries purplish-brown; the veins, a number of longitudinal lines between the veins, a number of oblique costal dashes, a subcostal and an internal longitudinal streak, black, with pale borders; female, with two whitish lines on the disc, towards apex; secondaries pearly-white, becoming brownish towards costal and abdominal borders; outer border broadly dark brown, with cupreous lustre; fringe whitish, varied with brown; body pale red-brown; collar purplish-slate colour, traversed by pale lines; tegulæ purplish, with black submarginal dotted line and reddish fringe; undersurface almost as in the preceding species, exhibit-

ing the normal coloration and pattern of *Xylophasia*:  
expanse of wings 1 inch 3—8 lines.

Curimata, Rio Juruá, 30th October; near mouth of  
Rio Juruá, 14th November; near Santa Cruz, Rio Soli-  
mões, 9th December, 1874; Boaventura, Rio Jutahi,  
24th January, 1875.

#### PRODENIA, *Guénéé*.

##### 7. *Prodenia inquieta*.

*Xylina inquieta*, Walker, Lep. Het. xi. p. 632,  
n. 22 (1857).

*Prodenia strigifera*, Walker, Lep. Het. xv. p. 1678  
(1858).

Juruana, Rio Purus, 24th September; Curimata, Rio  
Juruá, 30th October; Barreiras das Araras, Rio Solimões,  
15th November; Rio Javary, 3rd December, 1874.

Allied to "*Laphygma*" *orbicularis*; also very close to  
*Prodenia ignobilis* of Jamaica, but differing in the colour  
of its legs.

#### DARGIDA, *Walker*.

##### 8. *Dargida singularis*, n. sp.

Primaries above fuliginous-brown, with a faint lilacine  
gloss; the margins of the discoidal spots a falciform line  
below the cell, an oblique line angulated near the costa,  
some dashes upon the apical third of costa, an oblique  
apical line and the last branch of the subcostal vein pale  
tawny (cupreous when viewed from the side); the ordinary  
spots, and a discal series of irregularly-placed, tawny-  
edged discal spots, blackish; a transverse pale yellowish  
line across the end of the cell; a submarginal series of  
dots, and an interrupted marginal line, black; a marginal  
series of white points, beyond which the fringe is crossed  
by ferruginous dashes; secondaries white, with broad  
costal and external blackish borders; body dark brown,  
varied with whitish-brown and blackish; wings below much  
paler, the costal borders tinted with pink; discocellular  
spots blackish; an arched postmedian stripe on both  
wings, ill-defined and interrupted upon the secondaries;  
primaries with the discoidal area greyish; an irregular  
whitish discal line; secondaries white, the costal area  
pinkish-brown; a costal dash near the base; an apical

dusky patch; fringe brown; body whitish-brown, slightly tinted with pink: expanse of wings 1 inch 4 lines.

Villa Nova de Parentins, 5th April, 1874.

The pattern of the primaries in this species is quite like that of "*Heliophobus*" *dissectus*, Walker, from Ceylon, to which it is evidently nearly allied. The two genera can at once be distinguished by the antennæ, which in *Dargida* are simple in both sexes; the latter genus should perhaps be placed near to *Dianthæcia*.\*

It is just possible that Sepp's *P. phytolacca* may be *D. singularis*, but his figure is by far too rough to enable me to form any decided opinion respecting it.

### Family APAMIIDÆ.

#### CELÆNA, *Stephens*.

##### 9. *Celæna fuscata*, n. sp.

Primaries above fuliginous-brown, sericeous; costal border crossed by short blackish dashes; a very irregularly zigzag black line crossing the wing at basal third, limiting the central band internally, the latter slightly darker than the ground-colour, enclosing the reniform spot, which is white, edged with black, and with a testaceous or white outer margin; a blackish streak from the reniform spot to the inner margin; outer margin of the central band sinuous and black, not crenulated or dentated; a dusky discal line parallel to, and just beyond, the central band, and a submarginal line also parallel to it; secondaries white, pure in the male and sordid in the female, with greyish apical border, and narrow interrupted blackish marginal line; thorax fuliginous-brown, abdomen greyish-brown; wings below altogether paler; primaries greyish, the internal area, reniform spot, inferior border of discal and submarginal lines, white; the discal and submarginal lines alone visible, most distinct towards the costa; a marginal series of triangular black dots; secondaries white, the costal area sprinkled with brown scales, and crossed beyond the middle by an ill-defined arched line; a black discocellular dot; body whitish-brown: expanse of wings 11 to 12½ lines.

♀. Sapucaia Oroca, Rio Madeira, 15th May; ♂ Mara-

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\* "*Dianthæcia*" *graminicoleus* is a *Dargida*.

patá, Rio Negro, 29th December, 1874; ♀ Rio Jutahi, 25th January, 1875.

10. *Celæna dentilineata*, n. sp.

Coloration of the preceding, but the line across the basal third of primaries very indistinct, the line limiting the central band externally distinctly denticulate-sinuate; the upper half of the reniform spot, and sometimes the whole of it, testaceous or dull red; the line beyond the central band very indistinct; the fringe much longer; secondaries darker, frequently suffused with greyish, with the whole outer border greyish-brown; fringe white or whitish and longer; primaries below sericeous grey with grey-speckled whitish costal and external borders and reniform spot; a dusky costal crescent beyond the middle; a marginal series of black dots; secondaries sordid white with grey-speckled costal and external borders, apical half of fringe streaked and speckled with grey; a minute dusky discocellular dot and abbreviated discal line; body white: venter with three or four central blackish dots: expanse of wings 11 to 13½ lines.

Rio Madeira, 18th May; Itatoro, Rio Madeira, 2nd June; Vista linda, Rio Purus, 8th October; Tanariá, 9th October; Paricatuba, 10th October; Rio Juruá, 7th November; San Antonio, Rio Javary, 16th December, 1874.

Allied to *C. tepens*.

PERIGEIA, *Guénée*.

11. *Perigea otiosa*.

*Perigea otiosa*, Walker, Lep. Het. xv. p. 1693 (1858).

Fazenda, near the Rapids, Rio Tapajos, 14th March, 1874.

var. *P. paupera*, Walker, l. c.

Rio Madeira, 14th and 27th May; Manaos, 26th and 29th August; Fonteboa, Rio Solimões, 17th November; Rio Javary, 3rd December, 1874.

var. ? *P. imbella*, Walker, p. 1692.

Sapucaia oroca, Rio Madeira, 15th May, 1874.

If the latter be a modification of the preceding, it will take priority.

12. *Perigea hylea*.

*Phalæna-Noctua Hylea*, Cramer, Pap. Exot. iv. p. 48; pl. 312, fig. E (1782).

♂ Cararaucu, 16th April; ♀ Manaus, 6th November, 174.

This species is new to the Collection of the British Museum.

CONDICA, *Walker*.13. *Condica eupentia*.

*Phalæna eupentia*, Cramer, Pap. Exot. iii. p. 103; pl. 252, fig. E (1782).

*Condica palpalis*, Walker, Lep. Het. ix. p. 240, n. 1 (1856).

Rio Juruá, near the mouth, 14th November; Barreiras de Tunantins, 12th December, 1874.

## Family NOCTUIDÆ.

AGROTIS, *Ochsenheimer*.14. *Agrotis repleta*.

*Agrotis repleta*, Walker, Lep. Het. xi. p. 736 (1857).

Rio Purus, 9th September, 1874.

The type of this species is from Mexico.

## Family HADENIDÆ.

HADENA, *Guénée*.15. *Hadena aduncula*.

*Hadena aduncula*, Felder, Reise der Nov. Lep. iv. pl. 110, fig. 4.

*Hadena aperiens* (part), Walker, Lep. Het. xi. p. 755 (1857).

Rio Jutahi, 18th, 21st and 23rd January, 1875.

One example from Venezuela was with the examples of *H. aperiens*, it differs from Amazonian specimens only in being slightly larger.

## Family XYLINIDÆ.

## MAGUSA, Walker.

16. *Magusa strigifera*.

*Magusa strigifera*, Walker, Lep. Het. xi. p. 762 (1857).

Rio Juruá, 6th November; Rio Solimões, 9th December, 1874.

The type from St. Domingo is rather faded.

17. *Magusa dissidens*.

*Magusa dissidens*, Felder, Reise der Nov. Lep. iv. pl. 108, fig. 50.

Near Santa Cruz, Rio Solimões, 9th December, 1874; Coary, 11th January, 1875.

Allied to *M. orbifera* (*Xylina orbifera*, Walker).

## NYSTALEA, Guénéé.

18. *Nystalea squamosa*, n. sp.

Allied to *N. superciliosa*, much smaller, the primaries less produced at apex; primaries fuliginous-brown, with darker discal hastate spots between the veins; costal border beyond the middle crossed by oblique black dashes; basal two-thirds, particularly near the internal border, and the spots on external area, sprinkled with lilac scales; a central trisinate black-edged red-brown stripe from the costa to the first median branch; reniform spot pale, black-edged, white-bordered, bisinuated in front; two slightly sinuous oblique blackish lines just beyond the cell; a submarginal series of dusky spots, black near external angle; a marginal series of black dots; secondaries white, with broad dark-brown border as in *N. superciliosa*; body dark brown, thorax sprinkled with lilacine scales, abdomen with pale hind-borders to the segments; primaries below sericeous fuliginous-brown, with paler costal and internal borders; secondaries white, with testaceous costal border and brown external border; body whitish-brown, first and second pairs of legs fuliginous-brown above: expanse of wings 2 inches 1 line.

Rio Sapó, 12th December, 1874.

The genus *Nystalea* seems to me to be quite as closely allied to *Notodonta* as to *Cucullia*, and I think its Noctuid character very doubtful; the nuration does not help to



solve the difficulty, as in this respect there is no more than a generic difference between *Notodonta* and *Cucullia*, and not that between *Cucullia* and *Nystalea*. In *Cucullia* the antennæ are simple in both sexes but thickening gradually towards the base; in *Nystalea* they are of the same form, but are pectinated from the base to about the middle, where the pectinations fade away imperceptibly; in *Notodonta* they are much more strongly pectinated nearly to the apex. With regard to the pupa the *Cucullia* type seems to be more Bombycidian than that of *Notodonta*; this is also the case with *Calophasia*: all of these genera have the discoidal cell of primaries below clothed with long hair scales. The long bodies, with their terminal tufts and hood-like collars, and the wings with their streaky markings in various shades of brown forcibly recall to one's mind such Notodontid genera as *Etobesa*, *Destolmia*, *Danima* and even *Pheosia*. Is *Cucullia* a Noctuid genus? and if so—why?

## Family HEMEROSIIDÆ.

### APHUSIA, Walker.

#### 19. *Aphusia marmorea*, n. sp.

Basal half white, external half stramineous, irrorated with ferruginous; a blackish band beginning at centre of inner margin, abruptly enlarged to double its width just below the third median branch and then narrowing towards the costa; an arched ferruginous band uniting with the centre of the blackish band, whence it runs, slightly obliquely, almost to the outer margin, interrupted just below the last subcostal branch by a longitudinal white streak and then running inwards to the costal margin; base blackish; a ferruginous spot near the base of inner margin; secondaries sericeous brown, darkest at apex; apical half of fringe black, interrupted by silver-grey dots at the ends of the veins, anal half silver-grey; head and thorax stramineous, speckled with ferruginous; abdomen brown; undersurface sericeous leaden-grey; palpi and costal margin of primaries yellowish; inner border of primaries white: expanse of wings  $11\frac{1}{2}$  lines.

Rio Jutahi, 31st January, 1875.

Allied to "*Agrophila*" *rudisana* and *A. transmutata*, which (with the other New World species referred to *Agrophila* by Mr. Walker) may be transferred to *Aphusia*.

## Family ANTHOPHILIDÆ.

## XANTHOPTERA, Guénée.

20. *Xanthoptera botyoides*.

*Xanthoptera botyoides*, Guénée, Noct. ii. p. 240, 1024 (1852).

Pupunha, Rio Juruá, 1st November; Rio Solimões, 19th December, 1874.

I found several examples of this species in a supplementary drawer with a MS. label in Mr. Walker's handwriting, bearing the name "*Xanthodes aneocincta*;" no description of the species occurs under this name in the Museum Catalogue.

## MICROPHYSA, Guénée.

21. *Microphysa fumosa*, n. sp.

Primaries smoky-brown, crossed near the base by an angular black line; a whitish-edged irregular black line just beyond the middle; a blackish dot at the inferior angle of the discoidal cell; a marginal series of fusiform black dots; a slender irregular oblique discal line from the costa; secondaries pale grey; fringe of all the wings smoky-brown with blackish basal markings; head and thorax blackish, abdomen greyish-brown; posterior legs above whitish; primaries below slaty-grey; costal border brown; fringe spotted with brown; marginal black dots as above; secondaries sordid white, with marginal black dots; discocellulars and an ill-defined discal line dusky; fringe brown, spotted with blackish; body below pale brown: expanse of wings  $7\frac{1}{2}$  lines.

Rio Jutahi, 5th February, 1875.

The smallest true *Microphysa* known to me.

## Family PALINDIIDÆ.

## EULEPIDOTIS, Hübner.

22. *Eulepidotis ilyrias*.

*Phalæna ilyrias*, Cramer, Pap. Exot. i. p. 15, pl. 10, fig. E (1779).

Rio Jutahi, 27th January; Barreira branca, Rio Jutahi, 3rd February; Santarem, 4th February, 1875.

23. *Eulepidotis mabis*.

*Palindia mabis*, Guénéé, Noct. ii. pp. 277, 1077 (1852).

*Palindia fumata*, Felder, Reise der Nov. Lep. iv. pl. 91, fig. 17.

Manaos, 13th June; Rio Juruá, 3rd November, 1874.

## Section PALINDIA, Guénéé.

24. *Eulepidotis thecloides*.

*Palindia thecloides*, Walker, Lep. Het. xii. p. 851, n. 16 (1857).

West bank of Rio Madeira, about 5° 30' S., 16th May; also 18th and 22nd May; Curimata, Rio Juruá, 30th October; Rio Juruá, 2nd and 3rd November; Tabatinga, 27th November, 1874; Rio Jutahi, 30th and 31st January; Barreira branca, Rio Jutahi, 3rd February, 1875.

25. *Eulepidotis julianata*.

*Phalenu julianata*, Stoll, Suppl. Cramer, p. 40, pl. 8, fig. 4.

*Palindia egala*, Walker, Lep. Het. Suppl. iii. p. 807 (1865).

Rio Madeira, West bank, 16th and 18th May; Ilha das Araras, 3rd June; Rio Negro, 4th July; Jurnapuca, Rio Juruá, 28th and 29th October; Curimata, 30th and 31st October; Rio Juruá, 13th November, 1874; Boa-ventura, Rio Jutahi, 14th January; Rio Jutahi, 21st January; above Curnem, 29th January, 1875.

26. *Eulepidotis spectabilis*.\*

*Palindia spectabilis*, Walker, Lep. Het. xv. p. 1767 (1858).

Fazenda, near the Rapids, Rio Tapajos, 4th May, 1874.

Allied to *E. guttata* and *albata* of Felder. A rare species, not previously in the Collection of the British Museum.

27. *Eulepidotis argyritis*, n. sp.

Nearly allied to *E. dominicata*, but rather larger, the silvery area at the base of primaries larger; the central belt concave internally, expanded upon the costal margin,

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\* Possibly this may be *Palindia perlata* of Guénéé.

angularly excised in front; the silver patch beyond it of little more than half the size; the disc brightly shot with purple; the discal bands blacker, the inner one much more arched, the outer one very wide in the centre, with well-marked pale external border; markings of secondaries darker, the patch above the caudal angle smaller; undersurface altogether brighter in colour: expanse of wings 1 inch 10 lines.

Rio Jutahi, 27th January, 1875.

28. *Eulepidotis alabastraria*.

*Noctua alabastraria*, Hübner, Exot. Schmett. Zutr. figs. 311, 312.

*Palindia testaceiceps*, Felder, Reise der Nov. Lep. iv. pl. 111, fig. 16.

Rio Tapajos, 12th March, 1874.

PHRYGIONIS, *Hübner*.

29. *Phrygionis corinna*.

*Phalæna (Noctua) corinna*, Cramer, Pap. Exot. i. p. 47, pl. 29, fig. H (1779).

*Palindia crocoptera*, Felder, Reise der Nov. Lep. iv. pl. 111, fig. 18.

Forest near Serra de Juruty, 31st March, 1874.

30. *Phrygionis dives*, n. sp.

Primaries above clay-coloured, tinted with violet, with the base and costal border bright ochreous; a short black line, edged externally with metallic bluish-green across the costal border near the base; an internally black-edged green line crossing the wing at basal fourth, and followed by a grey line; a second very oblique grey line, followed by a metallic green line near the middle of the wing; discocellulars grey; three divergent grey lines across the disc, the central one with green internal border; an externally black-edged silver submarginal line; two or three grey marginal dots near the apex; fringe whitish-brown traversed by three parallel slender brown lines; secondaries ochraceous, imperceptibly shading into stramineous towards the base and costa, and into clay-colour upon the median interspaces, across the centre of these interspaces there is a bifid greyish-bordered opaline spot; a partially black and white-edged marginal orange spot on second median interspace; margin pale, white near anal angle, externally

edged with blackish-brown; fringe whity-brown, with a dark basal line; abdominal fringes whitish; body ochraceous, the thorax orange in front, the collar crossed by a pearly line; abdomen paler, with the base and sides whitish; wings below pale ochreous, primaries darker towards costa and apex; a red-brown bar across the end of the cell and a subapical nebula of the same colour; centre of costal border dull brown; fringe pale and greyish; secondaries with a brownish spot at centre of costa; outer margin white, diffused, with brown external marginal line; fringe testaceous; palpi ochreous; legs white below, anterior pair with the femora above brown, and the tibiæ and tarsi ochreous; second pair above ochreous, brightest at base of tibiæ and on the knees, where there is a small external opaline-white tuft; posterior pair white above, the tibiæ very robust and terminating in a tuft of hairs, black internally and opaline externally; pectus white; venter pale creamy-ochraceous: expanse of wings 1 inch 2 lines.

On board the Yeamiaba, 12th August; Rio Juruá, 7th November, 1874.

This beautiful species, although it has the general appearance of *P. corinna*,\* is more nearly allied to *P. cæruleilinea* of Walker: a brown species, with somewhat similar markings.

### 31. *Phrygonis setosa*, n. sp.

Primaries above dark clay-coloured, glossed with rosy lilacine: the costal border and apex ochreous, spotted with metallic blue and black; an irregularly-arched band (almost like the letter **D**, but with the lower part cut off) from basal third to near the outer margin, orange with metallic blue exterior margin, its interior margin bounded in part by a sinuated slender blackish line; within the arched band is a singular maculated black-edged marking like a falciform hook; two subapical longitudinal plumbeous streaks; a finely black-edged submarginal silver line; outer border orange; fringe grey; secondaries creamy testaceous, becoming rosy-brown near the outer border and on the median interspaces; outer border orange, bounded within by a partly black-edged silver line, which separates into a distinct spot upon the first

\* A species occurring at Pará has been confounded by Walker with *P. corinna*: it differs in having the metallic bands bright blue and the area between the first and second bands purplish-brown; the external area also is darker; the central blue line strongly angulated. I propose for this species the name of *P. regalis*.

median interspace, and is surmounted by a second similar spot tinted with blue; fringe grey, excepting at anal angle and upon abdominal border, where it is white; some scattered erect black bristles upon the inner margin of the abdominal fold; head and thorax orange; abdomen sordid flesh-pink, whitish at the sides and with the centre of the two basal segments orange; undersurface sericeous, primaries brown, with whitish internal area; secondaries whitish, with brownish costal border; body whitish: expanse of wings 1 inch.

Rio Tapajos, 12th March; West bank of Rio Madeira, 15th and 16th May; Ilha das Araras, 3rd June; on board the Yeamiaba, 11th August; Rio Juruá, 4° 40' S., 66° 40' W., 29th October; 6th November; Rio Javary, 5th December, 1874; Boaventura, Rio Jutahi, 26th January; Boa Vista, 1st February; Barreira branca, 3rd February; Santarem, 4th February, 1875.

This and the following species have the metallic lines arranged much as in the Geometrid species *Palyas aura*.

### 32. *Phrygonis metalligera*, n. sp.

Primaries pale buff, apical and costal areas faintly opaline; centre of internal area shot with rose colour, the dark spots upon it shot with blue; basal area and costa speckled with dark brown and silver; an irregularly  $\Omega$ -shaped silver line, from inner margin to subcostal vein, slenderly black-edged externally, and partially bordered with cupreous internally, enclosing an oblong interno-median black-brown patch and several small spots of the same colour; a curved discal series of five or six black dots, beyond which is a second abbreviated series of three smaller dots near external angle; a semicircular silver line limiting the apical area, internally bordered with cupreous; a submarginal series of black dots, each pair of which is united by a little silver line; two subapical longitudinal silver dashes, the lower one dividing an apical black spot; fringe at apex spotted with black; secondaries much paler, nearly white, with darker buff fringe and margin; a submarginal series of black dots and silver connecting lines as in the primaries; a reddish spot near the anal angle partly enclosed by two black-dotted silver spots, surmounted by a buff and then a silver spot; head and thorax pale buff, the latter dotted with brown; abdomen greyish, whitish at the sides and base, a central subbasal red-brown spot; undersurface creamy-white,

glistening; wings with a few minute marginal black dots at the ends of the veins, connected on the primaries by a slender undulated marginal brown line; fringe spotted with greyish: expanse of wings  $10\frac{1}{2}$  lines.

On board the Ycamiaba, 11th August, 1874.

DYOPS, Guénée.

33. *Dyops ocellata*.

*Phalæna (Noctua) ocellata*, Cramer, Pap. Exot. iii. pl. 276, fig. E (1782).

On board the Ycamiaba, 29th March; Abacaxis village, 12th May, 1874; Rio Solimões, 8th January; Manaos, 11th February, 1875.

This very beautiful bronze-tinted species is certainly not congeneric with *D. hatuey* and *D. confligens*, the latter are long-winged insects, with short and thick palpi.

Family PLUSIIDÆ.

PLUSIA, Ochsenheimer.

34. *Plusia includens*.

*Plusia includens*, Walker, Lep. Het. xii. p. 914, n. 59 (1857).

Rio Madeira, East bank,  $5^{\circ} 50' S.$ , 18th and 23rd May, 1874.

Since mistakes are best corrected as soon as discovered, I may here observe that Walker's *P. invicta*, from Borneo, is a Limacodid of the genus *Phrixolepia*.

BASILODES, Guénée.

35. *Basilodes semicuprea*.

*Plusia (?) semicuprea*, Walker, Lep. Het. xv. p. 1787 (1858).

Rio Jutahi, 23rd January, 1875.

Although this species has the coloration of a *Plusia*, its structure is similar to that of *B. pepita*, as shown in M. Guénée's figure.

The type is a worn example without a locality.

## Family CALPIDÆ.

## HAPYGINA, Guénée.

## 36. Hapygia smerinthoides.

*Corymbia smerinthoides*, Walker, Lep. Het. Suppl. iii. p. 765 (1865).

♂ Boa Vista, Rio Jutahi, 1st February, 1875.

## CAROIA, Walker.

## 37. Caroiia licormas.

*Phalæna (Noctua) licormas*, Cramer, Pap. Exot. i. pl. 74, fig. E (1779).

*Bagisara bombycoides*, Walker, Lep. Het. xv. p. 1792, n. 1 (1858).

Tabatinga, 29th November, 1874; Serpa, 13th February, 1875.

## DIAMUNA, Walker.

## 38. Diamuna severa.

*Phalæna severa*, Cramer, Pap. Exot. iv. pl. 398, fig. L (1782).

Rio Jutahi, 31st January, 1875.

Not previously in the Collection of the British Museum.

## ECREGMA, Walker.

## 39. Ecregma modesta, n. sp.

Primaries above sericeous red-brown, densely irrorated with rosy-whitish scales, crossed by two widely divergent darker red-brown lines, the inner one transverse, at basal third, with pale yellow internal border, the outer one oblique, discal, with pale yellow external border; two small blackish spots placed obliquely at the end of the cell; some dusky streaks upon the external area; secondaries similar in colour to the primaries, but becoming whitish towards the base and with white fringe, no markings; thorax like the primaries in colour, abdomen rather paler, antennæ brown; primaries below pale pinky-brown, with creamy-white internal border; secondaries cream-coloured; body cream-coloured, slightly tinted with rosy-brownish in front: expanse of wings 1 inch 7 lines.

Ilha Cuxinara, Rio Solimões, 13th October, 1874.



Near to *E. tran[s]ducta*, Walker, but differing in colour and the direction of the inner line upon the primaries.

### Family HEMICERIDÆ.

#### HEMICERAS,\* *Guénée*.

#### 40. *Hemiceras pulverula*?

*Hemiceras pulverula*, Guénée, Noct. ii. p. 382, 1238 (1852).

Rio Tarumá, Rio Negro, 31st July, 1874.

This species seems to be allied to *Phalæna gossypii* of Sepp (Surin. Vlind. pl. 23).

#### 41. *Hemiceras metastigma*.

*Hemiceras metastigma*, Walker, Lep. Het. xii. p. 974 (1857).

Marapatá, Rio Negro, 30th December, 1874.

Near to *Phalæna tetrastigma* of Sepp and *P. meona* of Cramer. Walker described the species from a very faded specimen; the natural colour of the primaries, thorax, and the margin and subanal spot of secondaries is sericeous ferruginous, tinted with greyish lilacine.

#### 42. *Hemiceras plana*, n. sp.

Primaries above sericeous ferruginous, crossed by three dark-edged yellow lines; the outer border and the area between the two first lines dusky; first line near the base, transverse, not reaching the inner margin; second line nearly straight, crossing the wing at basal third, third line oblique, discal; costal margin yellow; a blackish spot at the end of the cell; secondaries sericeous brown with darker veins, fringes tipped with white; thorax ferruginous, abdomen smoky-brown; wings below sericeous, primaries below rufous isabelline, with whitish internal area and ferruginous fringe; secondaries sandy-whitish, with abbreviated rufous isabelline outer border, and small black discocellular spot; body sandy-whitish, tinted in front and behind with rufous: expanse of wings 1 inch 5 lines.

Fonteboa, Rio Solimões, 17th November, 1874.

This species has the usual subanal thickened spot common to the secondaries of the males in this genus.

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\* This genus seems nearly allied to the preceding.

43. *Hemiceras striolata*, n. sp.

♂ Ferruginous; primaries mottled all over with little depressed striations; internal and basal areas irrorated with lilac scales; three pale-edged brown lines, the first, near the base, irregular, not reaching the inner margin; the second, at basal third, zigzag; the third, from apex to inner margin, straight and oblique; two conspicuous black dots near the centre of outer margin; secondaries paler, with golden-glossed whitish costal area and white fringe; head and collar mahogany-red, vertex cream-coloured; thorax greyish, abdomen pale ferruginous; undersurface creamy-whitish, the primaries, excepting towards inner margin, tinted with rufous, fringe dark ferruginous; secondaries, with the outer border slightly tinted with rufous; anal half of venter and upper surface of legs slightly rufous: expanse of wings 1 inch 5 lines.

Marapatá, Rio Negro, 30th December, 1874.

Although I have retained the genera *Ecreqma* and *Hemiceras* provisionally in the families of *Noctuities*, to which M. Guénée referred them, I feel pretty sure that their true affinity is to the Notodontid genera *Apela*, *Lophopteryx* and allies; the structure of the antennæ, thorax, legs and wings are purely Notodontid.

## Family GONOPTERIDÆ.

TIAUSPA, *Walker*.44. *Tiauspa argyria*, n. sp.

Primaries silvery-brown, irrorated with rusty-brown, dotted here and there with black; three lunulated red-brown stripes, the innermost and outermost almost zigzag and slightly divergent, the central one less distinct, arched, with whitish external border; reniform linear, red-brown with whitish margins; a very irregular submarginal series of brown-edged white lituræ; secondaries, with the costal border and apical half of fringe, white; anal angle irrorated with white and dark brown and crossed by two abbreviated parallel brown lines; head, sides of thorax, and base of abdomen white, crest of thorax red-brown; abdomen pale brown; wings below greyish-brown, the costal borders and external border of primaries silvery; internal area, abdominal border of secondaries and body below sordid-white: expanse of wings 1 inch 9 lines.

Rio Jutahi, 5th February, 1875.

Only a single example obtained.

COSMOPHILA, *Boisduval*.

45. *Cosmophila erosa*.

*Anomis erosa*, Hübner, Samml. Exot. Schmett.  
Zutr. figs. 287, 288.  
Serpa, in the bush, 24th April, 1874.

ANOMIS, *Hübner*.

46. *Anomis grandipuncta*.

*Anomis grandipuncta*, Guénée, Noct. ii. p. 400,  
1266 (1852).  
Fáro, 10th April, 1874.

Family AMPHIPIYRIDÆ.

BARYDIA, *Guénée*.

47. *Barydia japeta*.

*Phalæna (Noctua) japeta*, Cramer, Pap. Exot. iv.  
pl. 346, fig. G (1782).  
Manaos, on board the Guajara, 2nd September, 1874.

Very incorrectly figured by Cramer; there are three pale sandy-yellowish discal spots upon the primaries, the uppermost one united to a large black spot; even this spot is incorrectly situated in the figure.

Mr. Walker, not having seen an example of *B. japeta*, refers it, erroneously, to the genus *Safia*.

AMPHIPYRA, *Ochsenheimer*.

48. *Amphipyra purpurascens*, n. sp.

Dark greyish-brown, brightly shot with purple, spotted here and there with bright green, and speckled with black; basal fourth crossed by parallel undulated black lines; two widely divergent black-bordered pale brown stripes, forking from the centre of the inner margin to the costa, the inner one transverse, undulated, the outer one oblique, angulated and zigzag; two or three zigzag interrupted black lines just beyond and parallel to the outer stripe; a clear yellow longitudinal line from this stripe to the end of the cell, where there are two or three brown-edged black spots; four small white costal spots towards apex; an apical pale yellow spot streaked with ferruginous; a submarginal series of greyish-bordered bracket-shaped black lituræ, connected

by longitudinal grey dashes, with small rounded tawny-bordered marginal black dots, the whole together making a series of anchor-shaped markings; a marginal series of white dots at the ends of the veins; fringe alternately ferruginous and black; secondaries pale smoky-brown, with a broad external darker border; basi-costal area silvery-whitish; fringe creamy-white, deep ferruginous at anal angle; palpi and frons purplish-brown; vertex whitish-brown, with dark-brown line; thorax and collar dark brown, glossed with purple and spotted with black; abdomen smoky-brown, with whitish-brown basal tufts and a dorsal tuft of dark greyish-brown close to the base; primaries below fuliginous-brown, with pale external border; costa spotted with pale yellow; a pale yellow apical spot, and two submarginal series of small pale yellow hastate spots; an ill-defined angulated darker central belt; secondaries sordid white, with broad external fuliginous border; a series of marginal spots, and the fringe, pale yellow; basal area, excepting towards the abdominal border, blotched with fuliginous-brown; palpi and coxæ blackish; two anterior pairs of legs dark brown, varied with black; hind legs sandy-whitish, with a black spot at the end of each joint; venter pale sandy-yellowish, or whitish-brown, speckled with blackish, and with a black anal streak: expanse of wings 2 inches 4 lines.

Manaos, 6th January, 1874.

General aspect of *Barydia bufo*, but at once distinguishable by its shorter thicker palpi and narrower wings.

### Family TOXOCAMPIDÆ.

#### ATHYRMA, *Hübner*.

#### 49. *Athyрма misera*, n. sp.

Greyish-brown, with a faint lilacine tint; primaries with whitish veins; three irregular black costal spots, and a large subapical patch, dotted with white upon the costal margin, notched externally and margined internally by a black-edged pale line; a pale pinky belt before the middle, limited by two dusky-margined pale lines, reniform spot outlined in white upon a black patch, below it two dusky-bordered tawny spots; a submarginal series of black dots and a slender black marginal line; fringe whitish, tipped with blackish; secondaries with a diffused dusky discal

belt; several alternate pale and blackish lines towards the anal angle; fringe and margin as in primaries; under-surface fuliginous-brown; wings with ill-defined darker discal line; fringe as above: expanse of wings 1 inch 4—5 lines.

Itatoro, Rio Madeira, 2nd June; Rio Purus, 8th September, 1874.

*BANIANA, Walker.*50. *Baniana projiciens*, n. sp.

Fuliginous-brown, the primaries tinted with lilacine, the costal border and external area whitish-brown; an oblique quadrangular costal black spot near the base, a black dot followed by a small black spot in the cell and a large black internal patch, from the inferior margin of which a flap of black hair scales projects over the cell of secondaries; these black markings with slender white margins; reniform spot dark brown, with a black edge in the male, white with brown centre in the female, bounded internally by a very irregular black postmedian line; a central nebula surrounding the reniform spot and a subapical nebula upon the costa, dusky; an irregular bisinuated discal dusky line; a black marginal line; secondaries with whitish-brown fringe; frons whitish, vertex and collar burnt-sienna red; prothorax chocolate-brown; under-surface pale sandy-brown: expanse of wings ♂ 1 inch; ♀ 1 inch 2 lines.

♂ Aveyros, 12th March, 1874; ♀ Rio Jutahi, 5th February, 1875.

*PÆSULA, Walker.*51. *Pæsula nigricollis*, n. sp.

Primaries pale sandy-brown, sparsely irrorated with black; an indistinct abbreviated transverse subbasal line; an irregularly-trisinuated testaceous line, interrupted by two blackish spots across the basal third; two black spots on the discocellulars; a series of black dots beyond the cell, followed immediately by a straight mahogany-brown line, with yellow internal edge, bounding internally a broad and tolerably regular grey belt; an indistinct zigzag submarginal dusky line; a marginal series of black dots; secondaries darker than the primaries, with broad grey external border; outer margin and fringe cream-coloured; a marginal series of black dots; body pale

sandy-brown, with black collar; wings below sandy-whitish, with discal blackish stripe and black marginal spots; primaries clouded with grey; secondaries with black discocellular spot: expanse of wings 1 inch 5 lines.

Manaos, 29th August, 1874.

Allied to *P. delinquens*.

## Family HOMOPTERIDÆ.

### HOMOPTERA, *Boisduval*.

#### 52. Homoptera (?) *zonata*.

*Homoptera zonata*, Walker, Lep. Het. Suppl. iii. p. 878 (1865).

Mouth of Rio Jutahi, 18th January, 1875.

This species seems more like a *Stimmia* than a *Homoptera*.

#### 53. Homoptera (?) *gyrochila*, n. sp.

Fuliginous-brown; primaries tinted to the middle with lilacine; crossed by three very irregular dusky lines, the first near the base, the second almost central, interrupted by a large quadrate blackish spot at the end of the cell, the third lunulate, interrupted (with pale outer margin), limiting the external border; two black dots in the cell and a marginal series; fringe dark grey; primaries below greyish-brown, the costal and outer borders irrorated with sandy-yellowish; two blackish costal dashes succeeded by sandy-yellow spots; secondaries whitish, densely speckled with greyish-brown, the disc crossed by two nearly parallel dusky irregular stripes; a blackish discocellular spot; body sandy-yellowish: expanse of wings 11 lines.

Rio Javary, 7th December, 1874.

Allied to "*Homoptera*" *quadrisignata*, but I do not feel quite satisfied that this species is rightly located in *Homoptera*.

#### 54. Homoptera *Trailii*, n. sp.

Fuliginous-brown; wings with paler outer border traversed by a submarginal series of black-edged white dots, and limited internally by a black undulated line, which is also triundate on each wing; fringe dark grey, with a pale basal line; primaries clouded and spotted with pale brown and blackish; the central area limited on

either side by slender very irregularly denticulate or acutely zigzag black lines, a broadly zigzag dark brown central line; cell closed by three small white spots, the central one oblong and transverse, the two others small and rounded; a dusky costal patch limited externally by the outer black line; secondaries with shining greyish basi-costal area; a white dot at the end of the cell; an irregular dusky central line, followed by an undulated black discal line; undersurface smoky-greyish, with dusky external area, blackish on secondaries, and whitish-spotted border; two nearly parallel wavy discal dusky lines; primaries with whitish spots, and a cuneiform blackish spot beyond the middle of the costal border; secondaries with dusky-edged discocellular spot: expanse of wings 1 inch 9 lines.

Pariti, Rio Purus, 5th October, 1874.

Allied to *H. integerrima*, with which it agrees in marking though not in colour.

*H. involuta*, of Walker, is a species of *Ypsia* and *H. ustipennis*, a *Xylis*.

### Family HYPOGRAMMIDÆ.

#### SAFIA, Guénée.

##### 55. *Safia celia*.

*Phalena* (*Noctua*) *celia*, Cramer, Pap. Exot. iv. p. 109, pl. 346, figs. E. F (1782).

Rio Trombetas, 2nd March, 1874.

*S. celia* was not previously in the Museum Collection.

#### YRIAS, Guénée.

##### 56. *Yrias progenies*?

*Yrias progenies*, Guénée, Noct. iii. p. 23, 1349, pl. 15, fig. 10 (1852).

Lake Juruty, 2nd April, 1874.

As we do not possess examples of *Y. progenies* from the West Indies to compare with the Amazonian specimen, and as the latter is also a good deal rubbed, I cannot be certain of the identification; the markings are, however, very like those of the figure by M. Guénée. The species has more the aspect of a Deltoid than of a true Noctuid, still (for convenience sake) I provisionally incorporate it in this paper, following the arrangement of M. Guénée, adopted by Mr. Walker.

ODICE, *Hübner*.57. *Odice acharia*.

*Phalæna (Noctua) acharia*, Cramer, Pap. Exot. iv. pl. 346, C (1782).

♂ Manaos, 6th January; Vista linda, Rio Purus, 8th October, 1874.

Mr. Trail only took a single pair of this species, which is new to the Museum Collection. It does not appear to be congeneric with *Yrias*, and therefore I adopt Hübner's generic name for it. Whether *O. pamphilia* is congeneric I cannot say without seeing it. "*Letis*" *incipiens* is an allied species.

CAMPOMETRA, *Guénée*.58. *Campometra glauca*.

*Phalæna (Noctua) glauca*, Cramer, Pap. Exot. iv. pl. 311, fig. G (1782).

Rio Jutahi, 20th, 24th and 25th January, 1875.

This, rather than *Hadena*, seems to be the correct place for this species; the pattern is very like that of Guénée's species.

PHOSPHILA, *Hübner*.59. *Phosphila* (?) *tatosoma*, n. sp.

Arrangement of markings somewhat as in *Amphipyra sanguinipuncta* (Guén. Noct. iii. pl. 18, fig. 2); primaries purplish-grey, clouded with sienna, and transversely traversed by undulating brown lines; central belt indicated by two widely divergent irregular fulvous lines broadly edged with black on both sides, the outer line lunulated and limiting the external area; a white dot on each side of the reniform spot; external border broadly dark purplish-grey with pale internal edge, a submarginal irregularly undulated buff line; costal margin interrupted by white dots; a dentate-sinuate black marginal line, followed upon the fringe by a pale buff line; fringe beyond the pale line slaty-grey, interrupted opposite to the veins by whitish dots; secondaries smoky-brown; two dusky-bordered indistinct whitish discal lines, which converge and are angulated towards the anal angle; marginal black line and fringe nearly as in primaries; body corresponding in general coloration with the wings, the abdomen with white posterior edges to the segments; a bifurcate



terminal whitish-brown anal tuft; undersurface smoky-brown; wings crossed by two dusky-bordered indistinctly whitish discal lines; discocellulars crossed by dusky-margined whitish angulated spots, beyond which on the secondaries are two very indistinct dusky streaks; fringe blackish with slender whitish basal line and whitish spots opposite to the terminations of the veins; costa of primaries sordid white, crossed by dusky dashes; internal border whitish; legs grey, the tarsi above blackish, banded with white, the anterior tibiæ clothed with long whitish hair: expanse of wings 1 inch 7 lines.

Mauhes River, 5th May, 1874.

This singular species seems allied to *Phosphila ursipes* of Hübner; but, as I have not seen examples of this insect, I cannot be sure of its affinity to it; some of the characters, such as the terminal anal tuft and the fan-like hairy clothing of the anterior tibiæ seem to show structural proximity to the *Notodontidæ*, but in all other respects the species agrees better with the group in which I have placed it.

#### CÆNIPETA, Hübner.

##### 60. *Cænipeta bibitrix*.

*Cænipeta bibitrix*, Hübner, Zutr. Exot. Schmett. fig. 343.

Lake Maracaná, 7th April; Serpa, 22nd April; Rio Madeira, 16th May; Rio Marmellos, Rio Madeira, 1st June; Boa Vista, Rio Purus, 12th September; Mamiva, Rio Purus, 29th September; near Porto Salvo, 3rd October; Rio Juruá, near the mouth, 14th November, 1874.

This species is new to the Museum Collection; it was only known to M. Guénée by the figure.

##### 61. *Cænipeta polynoë*.

*Cænipeta polynoë*, Guénée, Noct. iii. p. 31, n. 1359 (1852).

Rio Tarumá, Rio Negro, 3rd July, 1874.

A single typical example of this species, previously only represented in the Museum Collection by a damaged pair of the Central American variety. *C. feronia* of Felder is a nearly allied form.

62. *Cænipeta lilacina*, n. sp.

*Cænipeta lobuligera* (part), Walker (nec Guénée),  
Lep. Het. xiii. p. 1091 (1857).

Differs from *C. lobuligera* in its more rounded primaries, with more numerous undulated brown lines; the pale stripes on the secondaries less distinct; wings below altogether darker; the secondaries sordid pale buff, the markings much more sharply defined than in *C. lobuligera*; from *C. colliquens* (which has little in common with Guénée's species) it differs in its lilacine instead of green or greenish primaries, upon which the lines are less irregularly waved, and not quite so distinctly undulated; the secondaries are also paler, less fuliginous, with much better-defined pale discal streak from the anal angle; wings below considerably paler throughout: expanse of wings 1 inch 6 lines.

São Antonio, Rio Negro, 5th July, 1874.

Under *C. lobuligera*, Walker also placed examples of *C. aniloba*.

63. *Cænipeta colliquens*.

*Noctua semigeometra*, *Heliothis undulata*, *colliquens*, Hübner, Zutr. Exot. Schmett. figs. 117, 118.

*Cænipeta lobuligera* ♀? Guénée, Noct. iii. p. 32, n. 1360 (1852).

♂ Sepatiny, Rio Purus, 26th September; ♀ Rio Javary, 4th December, 1874. Not previously in the Museum Collection.

64. *Cænipeta aniloba*.

*Cænipeta aniloba*, Guénée, Noct. iii. p. 33, n. 1361 (1852).

Rio Tapajos, 4° 20' S., 14th March; Borba, 14th May; Barcellos, Rio Negro, 30th June, 1874.

65. *Cænipeta dimidiata*, n. sp.

Primaries with the basal half, up to the first black discal line, bright pale green; external half and abbreviated fascia enclosing the reniform brown, brilliantly shot with purple; black and brown transverse irregular lines almost as in *C. lobuligera*; secondaries orange, more or less streaked and clouded with grey in the male; a broad tapering submarginal black band, uniting with a marginal series of elongate black spots towards the

apex; fringe in the males more or less sordid externally; body greyish-brown, posterior margins of abdominal segments whitish or orange; wings below ochraceous; primaries with the external half purplish-brown, the markings ill-defined, an ochraceous costal spot; secondaries with the usual markings, but the central black lines ill-defined; pectus and underside of legs white; knees broadly black above and ochraceous at the sides; tarsi above pale buff, the anterior pair banded with black, the others with reddish-brown: expanse of wings 1 inch 4—5 lines.

Abacaxis River, 30 miles from the mouth, 10th May; Pariti, Rio Purus, 5th October; São Paulo, 26th November; below Tabatinga, 28th November, 1874.

#### HYPOGRAMMA, Guénée.

##### 66. *Hypogramma suttea*.

*Cænipeta suttea*, Guénée, Noct. iii. p. 30, n. 1357 (1852).

Mouth of Rio Sapó, 13th December, 1874.

If, as I believe, I have rightly identified this species, its resemblance to *Cænipeta bibitrix* is purely superficial, and the insect is in reality a *Hypogramma*.

##### 67. *Hypogramma damonia*.

*Phalæna (Noctua) damonia*, Cramer, Pap. Exot. iv. p. 71, pl. 324, figs. B, C (1782).

*Phalæna sulima*, Stoll, Suppl. Cramer, p. 175, pl. 40, figs. 5, 5 C (1791).

Sepatiny, Rio Purus, 29th September; Mabidiry, 30th September; Rio Juruá, 26th October; Curimatá, 30th October; Uruçaca, 1st November; Rio Juruá, 7th November; Gavião, 10th November; Rio Javary, 3rd December, 1874; Rio Jutahi, 30th January; Boa Vista, 1st February, 1875.

One of the commonest of all New World Noctuids: it varies slightly in the more or less strongly-defined black line upon the white belt of primaries; in some examples it is very indistinct, giving a different aspect to the insect.

## Family CATEPHIIDÆ.

STICTOPTERA, *Guénée*.68. *Stictoptera subaurata*.

*Stictoptera subaurata*, Walker, Lep. Het. xiii.  
p. 1132, n. 5 (1857).

*Stictoptera phryganoides*, Walker, l. c. xv. p. 1812  
(1858).

*Nagara steirialis*, Walker, l. c. Suppl. 4, p. 1379  
(1865).

Rio Negro, 4th July; Marapatá, 30th December, 1874;  
Manaos, 3rd January; Rio Jutahi, 3rd and 5th February,  
1875.

COCYTODES, *Guénée*.69. *Cocytodes schneideriana*.

*Phalæna schneideriana*, Cramer, Pap. Exot. iv.  
p. 37, pl. 308, fig. A (1782).

Rio Jutahi, 27th January, 1875.

Allied to *C. immanis*; what M. Guénée and Mr. Walker were about to refer this thick-bodied and altogether robust-looking moth to the genus *Letis* I cannot imagine; the only excuse for Mr. Walker is that he probably blindly followed M. Guénée, and there being no example of Cramer's species in the collection, never afterwards discovered his error.

## Family BOLINIDÆ.

BOLINA, *Guénée*.70. *Bolina fasciolaris*.

*Ædia fasciolaris*, Hübner, Zutr. Exot. Schmett.  
figs. 443, 444.

Near Santa Cruz, Rio Solimões, 9th December, 1874.

71. *Bolina cunearis*.

*Bolina cunearis*, Guénée, Noct. iii. p. 70, n. 1414  
(1852).

Maricá, Rio Madeira, 23rd May; Curimatá, Rio Juruá, 30th October, 1874.

The Amazonian examples are all referable to the more prevalent form of the species described by M. Guénée as var. A.

## Family HYPOCALIDÆ.

## HYPOCALA, Guénée.

72. *Hypocala andremona*.

*Phalæna (Noctua) andremona*, Cramer, Pap. Exot. iv. pl. 358, C, D (1782).

*Hypocala filicornis*, Guénée, Noct. iii. p. 76, n. 1421, pl. 13, fig. 7 (1852).

Boa Vista, Rio Purus, 12th September; Rio Juruá, 6th November, 1874; Barreira branca, Rio Jutahi, 3rd February, 1875.

I have no doubt that *H. andremona*, as figured by Cramer, is a highly-coloured form of the widely-ranging *H. filicornis*. The examples taken by Dr. Trail agree in all respects with M. Guénée's figure.

## Family OPHIDERIDÆ.

## OPHIDERES, Boisduval.

73. *Ophideres scabellum*.

*Ophideres scabellum*, Guénée, Noct. iii. p. 117, n. 1488 (1852).

Gavião, Rio Juruá, 10th November, 1874.

A single male of this species, the female of which only was previously in the British Museum.

## Family EREBIDÆ.

## VOGIA, Walker.

74. *Vogia amplivitta*.

*Vogia amplivitta*, Walker, Lep. Het. xv. p. 1818, n. 1 (1858).

*Azeta (?) pertinax*, Felder, Reiseder Nov. Lep. iv. pl. 99, fig. 1.

Aruman, Rio Purus, 9th September, 1874; Boaventura, Rio Jutahi, 24th January, 1875.

Apparently a rare species: it seems quite out of place in the family to which Walker has referred it.

GIGIA, *Walker*.75. *Gigia obliqua*.

*Gigia obliqua*, Walker, Lep. Het. Suppl. iii. p. 942 (1865).

*Brotis* (?) *stenogaster*, Felder, Reise der Nov. Lep. iv. pl. 119, fig. 5.

Uttary, Rio Purus, 25th September, 1874.

Walker's type is a rather worn specimen without a locality.

BLOSYSIS, *Hübner*.76. *Blosyris despecta*.

*Brujas despecta*, Walker, Lep. Het. xv. p. 1819 (1858).

Abacaxis River, 10th May, 1874.

The fairly perfect example taken by Dr. Trail proves this species to be a *Blosyris* allied to *B. abadirina*; it may be the *Phalæna-Noctua scolopacea* of Cramer (pl. 174, C).

77. *Brujas helima*.

*Phalæna (Noctua) helima*, Cramer, Pap. Exot. iv. p. 40, pl. 309, fig. D (1782).

Manaos, 22nd December, 1874.

Walker is wrong in referring this species to *Blosyris*; it is allied to *Brujas posterior* from Jamaica.\* I am certain that no specimen ever was (as Cramer asserts) taken at Sierra Leone.

LETIS, *Hübner*.78. *Letis occidua*.

♂. *Phalæna-Bombyx occidua*, Linnæus, Syst. Nat. p. 812, n. 14; Clerck's Icones, pl. 54, figs. 1, 2.

♀. *Phalæna-Noctua corisandra*, Cramer, Pap. Exot. iv. p. 189, pl. 384, figs. A, B (1782).

Pará, 6th March, 1875.

This species seems to be rare; we previously only possessed a much-injured example without locality.

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\* A nearly allied species, *B. rengus*, from St. Domingo, is identical with *Letis intracta*. *Letis incipiens* (the species which succeeds it in the Catalogue) is identical with *Xylis* ('*Homoptera*') *ustipennis*.

79. *Letis marmorides*.

♀. *Phalæa* (*Noctua*) *marmorides*, Cramer, Pap.

Exot. i. p. 25, pl. 16, figs. E, F (1779).

On board the Yeamiaba, 26th August, 1874.

Not previously in the Museum Collection: it is allied to the preceding species and to "*Brujas*" *maculicollis*; it may possibly be an extreme variety of *L. occidua*, ♀.

80. *Letis integra*.

*Letis integra*, Walker, Lep. Het. xiv. p. 1273, n. 24 (1857).

*Syrnia letiformis*, Guénée, Noct. iii. p. 158, n. 1549 (1852).

Mouth of Rio Jutahi, 18th January, 1875.

If *Syrnia* be a distinct genus from *Letis*, which I doubt, the difference exists in its shorter and more strongly-denticulated wings, which, in fact, are the only distinctions pointed out by M. Guénée; it therefore stands to reason that *Syrnia letiformis* is an anomaly. The species is nearly allied to *Letis xylia* and *L. scops*; *Syrnia mineis* is also a *Letis*.

81. *Letis alauda*.

*Letis alauda*, Guénée, Noct. iii. p. 154, n. 1543 (1852).

♂. On board the Yeamiaba, 17th August; Manaos, 22nd December, 1874.

This species is new to the National Collection; it is somewhat nearly allied to the preceding, but much larger, and the female is broadly clouded with testaceous, this colour occupying the whole central area of the secondaries.

82. *Letis Trailii*, n. sp.

♀. Allied to the preceding species, but much darker, with the markings more sharply defined; fuliginous-brown, irrorated with stramineous; wings crossed in the centre by six parallel dentate-sinuate dark-brown or black lines, the area enclosed by which is wholly testaceous in the secondaries, so as to form a broad central belt, but only the external border of which is testaceous on the primaries; basal area of primaries crossed by two irregularly undulated pale-bordered blackish lines; a white costal spot beyond the cell, between which and the apex are three or

four whitish dots; disc crossed by an ill-defined dentate-sinuate blackish stripe, bounded externally, on first median interspace, by a testaceous >-like character; two parallel zigzag black submarginal lines; discoidal spots brown, with black margins, the "orbicular" slightly elliptical in form, the "reniform" D-shaped; secondaries with brown discocellular spot, speckled with testaceous and edged with black; an angular testaceous marking on the basi-abdominal area; disc crossed by a slightly-undulated arched black stripe, bounded externally at apex by a diffused testaceous patch, and upon the first median interspace by a dash of the same colour; two undulated black submarginal lines; body brown, varied with black, the abdomen with whitish-bordered black segmental bars interrupted in the centre by whitish spots; undersurface grey, white, and black, much as in *L. alauda*, the discoidal spots dark and well-defined, both wings crossed beyond the middle by a black-bordered angulated white belt; several white discal spots; fringe varied with white; secondaries crossed in the centre by three slender parallel irregular brown lines, the middle one indistinct; basal area greyish-white; body below whitish, venter white: expanse of wings 4 inches 4 lines.

Boaventura, Rio Jutahi, 24th January, 1875.

Dr. Trail, unfortunately, only obtained one example of this fine species. All the species of *Letis* seem to be rare.

### 83. *Letis confundens*.

♀. *Syrnia confundens*, Walker, Lep. Het. xiv. p. 1279, n. 6 (1857).

♂. On board the Yeamiaba, 27th August, 1874.

Allied to the preceding, but considerably smaller and more uniformly fuliginous on the upper surface; the form of the male at once decides the generic position of this species.

### LATEBRARIA, Guénée.

### 84. *Latebraria janthinula*.

*Latebraria janthinula*, Guénée, Noct. iii. p. 160, n. 1551 (1852).

Pará, 8th March, 1875.

A single example only of this rare and beautiful species.

Following Walker's Catalogue, it would be necessary here to introduce *Crinodes*, referred by that author to the



*Noctuites*, but actually belonging, as I find, to the *Notodontidæ*; to the latter family *Bardaxina* also belongs; it is closely allied to, if distinct from, *Etobesa*.

### Family POAPHILIDÆ.

#### PHURYS, Guénée.

#### 85. *Phurys lineolaris*.

*Noctua lineolaris*, Hübner, Eur. Schmett. Noct. fig. 454.

Uricurituba, Rio Tapajos, 17th March, 1874.

“*Phurys*” *biangulata* of Walker is a *Heteropygas*; an example of this species from Santarem was confounded with *P. basilans* of Guénée, which it resembles in colouring. *P. contenta*, Walker, is identical with *Poaphila scita* of the same author, and must be referred to the genus *Hemiceras*, being evidently nearly allied to *H. linea*, Guénée. *Phurys garnoti* of Guénée, although it has the general aspect of *Trigonodes maxima*, seems structurally more nearly allied to the other species of *Phurys*. *P. inficita* would be better placed in *Poaphila*.

### Family REMIGIIDÆ.

#### REMIGIA, Guénée.

#### 86. *Remigia latipes*.

*Remigia latipes*, Guénée, Noct. iii. p. 314, n. 1774 (1852).

Mauhes River, 1st May, 1874.

#### CATAMELAS, Rogenhofer.

#### 87. *Catamelas caripina*.

*Catamelas caripina*, Felder and Rogenhofer, Reise der Nov. Lep. iv. pl. 119, fig. 21 (1874).

Uttary, Rio Purus, 25th September, 1874.

A very singular species, in which the undersurface is fully twice as dark as the upper. It is new to the Museum Collection.

The *Phalæna brunnea* of Cramer (cclxxxvii. G.) seems to be a nearly-allied species.

EPIDROMIA, *Guénée*.88. *Epidromia signata*, n. sp.

Pale brownish salmon-colour, sparsely speckled with black scales; external border of wings olive-brown, diffused internally, discal area slightly washed with pale lilacine; primaries with a black costal dot above the cell and two spots just beyond the cell; reniform almost pyriform, jet black with slender white margin; a submarginal series of indistinct dusky spots; secondaries with sericeous whitish costal border; a discal transverse series of black dots; head and collar slightly lilacine; secondaries below and internal border of primaries pale flesh-coloured; all the wings with a curved discal series of black dots almost connected by a series of black lunules immediately beyond and between them; a pale-edged discocellular black dot; venter and sides of pectus pale: expanse of wings 1 inch 6—8 lines.

♀. Mabidiry, Rio Purus, 30th September; Rio Juruá, 31st October, 3rd November; Rio Javary, 6th December, 1874.

89. *Epidromia rivularis*, n. sp.

♂. Pale ferruginous-brown, striolated with grey, with dark external border; discal area slightly washed with lilacine, whitish; reniform 8-shaped, the upper half being whitish with brown margin, and the lower half jet black with whitish margin; a crinkled whitish line beyond the cell on the secondaries dotted internally with black; a submarginal series of whitish-dotted dusky spots, very ill-defined on the secondaries; bases of the sinuations of the fringe pale; wings below, as in *Obroatis negata*, very pale smoky-brown; the upper surface of legs, outer surface of palpi and discoidal area of primaries dull red; wings with a curved discal series of black dots almost connected by a series of black lunules just beyond and between them; fringe dark brown: expanse of wings 1 inch 10 lines.

Rio Juruá, 27th October, 1874.

Unfortunately Dr. Trail only obtained one example of this species.

90. *Epidromia negata*.

*Obroatis negata*, Walker, Lep. Het. xv. p. 1635, n. 1 (1858).

Mamiva, Rio Purus, 28th September; Rio Juruá,

4° 40' S., 66° 40' W., 29th October; Pupunha, 5th November; Gavião, 10th and 12th November; below Tabatinga, 28th November; Marapatá, Rio Negro, 30th December, 1874; Boaventura, Rio Jutahi, 24th and 26th January; Boa Vista, 1st February, 1875.

The type of this species is somewhat aberrant, the reniform being represented by a slender whitish-edged black litura; it is also faded, and thus much resembles a *Toxocampid*; fresh examples are much darker in colour, and the ten specimens taken by Dr. Trail agree in having the discoidal spots pale greenish-yellow with dusky margins.

91. *Epidromia columba*, n. sp.

Pale bronzy-olivaceous; wings with a diffused discal belt of greyish-lilacine; an oblique line just beyond the discoidal cells, ill-defined on the secondaries, but sharply defined and laky-brown, with an incurved subangulation just beyond the reniform spot, on the primaries; a discal series of black dots united by grey semicircles into a crinkled line upon the primaries; an ill-defined submarginal series of whitish dots; primaries with two triangular black costal spots; reniform spot **D**-shaped, pale greenish-yellow with black margin and enclosing an oblique **B**-shaped marking; orbicular punctiform, black; secondaries with the costal area pearly-white; abdominal fringe white; abdomen pearly-greyish, whitish towards the anus, undersurface altogether paler than above, primaries pale sandy-yellowish, with brown external border, black discoidal dots, discal crinkled line as above, and pearly internal area; secondaries with whitish abdominal area, apex and outer margin brown, a black discocellular dot and a discal series of black dots; body below whitish, legs pale reddish-brown: expanse of wings 1 inch 8 lines.

Guará, Rio Solimões, 22nd October, 1874.

A beautiful soft-looking species, of which unhappily only a single example was obtained.

92. *Epidromia distincta*, n. sp.

Purplish-brown, with the external fringes and the veins on the disc of the primaries reddish; a discal series of black dots united by a castellated whitish line; external border greyish, limited internally by a very ill-defined whitish squamose line (the only traces of which in one

example are a series of blackish-edged white dots on the primaries); these wings with small white-edged black orbicular spot; reniform also black and white-edged, but very large and excised in front; postdiscoïdal area, some costal spots, a squamose irregular subbasal line, and an apical spot whitish ash-colour; secondaries with an ill-defined greyish discal band parallel to the outer margin; costal area pale sericeous-brown; annus pale buff; under-surface pale smoky-brown, with dusky discocellular dots: expanse of wings 1 inch 10 lines.

Pupunha, Rio Juruá, 5th November; Braga, Rio Javary, 7th December, 1874.

Only a pair of this striking species was obtained.

93. *Epidromia ocellata*, n. sp.

Lilacine-brown; the outer borders of the wings chocolate-brown, diffused internally; a discal curved series of white dots with black internal margins; a submarginal ill-defined series of whitish dots; primaries with an irregular series of white dots across the basal area; two blackish costal dashes above the end of the cell; orbicular wanting; reniform large and irregular, excised in front at the upper angle, jet black with a white margin; secondaries with a black discocellular ocellus with creamy-white iris and **W**-shaped pupil; head and collar darker than the thorax, abdomen paler; primaries below rust-red; internal border sericeous whity-brown; a dot in the cell, two on the discocellulars and a discal series, connected externally by a crinkled greyish-white line, black with greyish-white margins; a greyish-white apical spot; secondaries whity-brown speckled with black, suffused with rust-red, which increases in intensity towards the apical border, which is as red as the primaries; a discocellular black dot and discal series as in the primaries; pectus whitish, coxæ and external fringes of the femora and tibiæ rust-red; external surface of the palpi, upper surface of anterior tibiæ and the tarsi above chocolate-brown, the latter banded with white: expanse of wings 1 inch 8 lines.

Mamiva, Rio Purus, 28th September, 1874.

Only a single example obtained.

CEROMACRA, *Guénée*.

94. *Ceromacra tymber*.

*Phalæna tymber*, Cramer, Pap. Exot. ii. p. 190, pl. 167, fig. D (1779).

Itaituba, 15th March; on board the Yeamiaba, 11th August; on board the Guajara, mouth of Rio Purus, 6th September; Manaos, 7th September; Jurucua, Rio Purus, 24th September; Hyntanaham, 27th September; Rio Juruá, 27th October; Pupunha, 5th November; Juruapuca, 11th November; Rio Tabatinga, 29th November; Marapata, Rio Napo, 31st December, 1874; Boaventura, Rio Jutahi, 24th January; Rio Jutahi, 5th February, 1875.

This apparently common species is new to the Museum Collection.

95. *Ceromacra fuliginea*, n. sp.

♂. Fuliginous, primaries paler than the secondaries, bronzy; an irregular dusky streak across the basal third, an angular blackish spot on the discocellulars, and an angulated dusky discal line a little beyond the cell; a black subbasal spot; a large sordid white apical spot; secondaries with whitish costal border; head lilacine; anal tuft testaceous; wings below pale sericeous greyish-brown; discocellulars dusky; primaries with whitish interno-basal border; body below whitish; tarsi above blackish, banded with white: expanse of wings 2 inches.

♀. Chocolate-brown, uniformly coloured; markings of primaries indistinct, apical spot small and obscure; under-surface fuliginous, the primaries with rather paler internal border; discocellulars slightly dusky; tarsi above blackish, banded with testaceous: expanse of wings 2 inches 1 line.

♀. Lagas, mouth of Rio Negro, 5th August; ♂, Sepatiny, Rio Purus, 29th September, 1874.

Before leaving the present family I may note that *Massava scissa* of Walker is *Isogona continua* of Guénéé.

### Family FOCILLIDÆ.

All Amazonian or New World forms, referred by Walker to the first genus of this family (*Zethes*), may be placed under *Ephyrodes*; as, for instance, *Z. quatiens*, to which "*Focilla*" *decolor* is nearly allied.

## MAZACYLA, Walker.

96. *Mazacyla abydas*.

*Noctua abydas*, Herrich-Schäffer, Auss. Schmett.

App. fig. 565 (1869).

Sepatiny, Rio Purus, 29th September; Pariti, 5th October; Pupunha, Rio Juruá, 5th and 6th November; Pupunhazinho, 8th November, 1874; Boaventura, Rio Jutahi, 1st February; Barreira branca, 3rd February, 1875.

*Mazacyla fusifera* is synonymous with *Focilla relata*.

## AZATHA, Walker.

97. *Azatha marcellina*.

*Phalæna (Noctua) marcellina*, Cramer, Pap. Exot.

iv. p. 48, pl. 312, fig. F (1782).

Rio Purus, 23rd September, 1874.

Not previously in the Museum, but closely allied to *A. retardens*.

## TAUTOBRIGA, Walker.

98. *Tautobriga euspila*.

*Tautobriga euspila*, Walker, Char. Undescr. Lep. p. 56, n. 93 (1869).

*Amphigonina (?) erythropus*, Felder, Reise der Nov. Lep. iv. pl. 118, fig. 25 (1875).

♂. Manaos, 13th June, 1874.

The type is a somewhat worn female, without antennæ, from *Limas*. The genus is, in my opinion, intermediate in character between *Focilla* and *Milyas*; but I must admit that I regard the *Focillidæ* and *Amphigoniidæ* as too closely related for separation; the only structural difference pointed out by M. Guénée is a slight modification of the palpi, scarcely sufficient in some instances to separate the species generically: no other difference of the slightest value is indicated.

*Focilla Guérini*, Guénée, is closely allied to *Amphigonina costalis*, Walker. Both species would be better placed in *Azatha*; as also probably *Focilla Ghiliani* (which, however, I have not seen). *Amphigonina ? rudis* of Walker is a *Nedusia* (*Geometrites*).

## LACERA, Guénée.

99. *Lacera amazonica*, n. sp.

Fuliginous-brown, varied with red-brown and shot with lilacine; primaries darker than the secondaries, greyish in general tint; crossed by irregular black lines; the costal border, almost to the apex, sordid whitish, interrupted by the black lines, and one or two dark-brown dashes; basal area speckled with whitish; an irregular whitish belt, bounded by sinuated black lines from the cell to the inner margin; reniform greyish, enclosing a small black-edged whitish spot, and margined with whitish; *a broad black-bordered oblique lilacine belt from the reniform spot to the external angle*; secondaries reddish towards external border; costal area bronzy; *an internally white-edged black spot, in some lights brilliantly shot with ultramarine blue, at apex*; a dusky spot at the end of the cell; base of the cell and the disc crossed by alternately black and reddish-brown zigzag lines; *two widely-separated alternately black and buff longitudinal dashes between the first median and the abdominal margin*; a black oblique discal streak from the anal angle; a macular submarginal black line; thorax red-brown; abdomen blackish, with testaceous edges to the segments; undersurface sordid stramineous, densely speckled with black, disc and outer margin clouded with chocolate-brown, and crossed by two or three undulated black lines; primaries with a pearly-white subapical spot; secondaries with two zigzag blackish lines forming the edges of an ill-defined dusky belt, which crosses the cell; a submarginal cinereous belt bounded internally by an undulated blackish line; apical spot as above: expanse of wings 1 inch 10 lines to 2 inches 1 line.

♂. Rio Jutahi, 25th January; ♀ Santarem, 4th February, 1875.

Only a single pair was obtained of this species; it is nearly allied to "*Homoptera*" *pacifica* of Walker, but is structurally better placed in *Lacera* than in *Homoptera*.

## AMPHIGONIA, Guénée.

100. *Amphigonia placida*, n. sp.

Greyish-fuliginous, the wings above shot with lilac; primaries crossed by three ill-defined dusky stripes, the two first of which are united, so as to form a loop, upon

the costal margin, third stripe sigmoidal; secondaries crossed in the centre by two reddish-brown subangulated stripes, the lower half of the area between which is pale ferruginous; two or three white-speckled black spots in an oblique series parallel to the anal half of the outer margin, the latter slightly excavated; thorax tinted with lilacine; undersurface pale fuliginous, the secondaries whitish, excepting upon the costal and external borders; a nearly central transverse dusky line; posterior half of pectus and the venter sordid white: expanse of wings 1 inch & lines.

Sepatiny, Rio Purus, 29th September, 1874.

This species is slightly abnormal in form.

#### TERATOCERA, Guénée.

101. *Teratocera erycata*.

*Phalæna erycata*, Cramer, Pap. Exot. iii. pl. 287, D ♀; iv. pl. 370, E ♂ (1782).

Boa Vista, Rio Purus, 12th February; Paranamirim, 19th April; Rio Javary, 3rd December, 1874.

The genus *Rhescipha* should properly be placed next to *Teratocera* and not in the *Limacodidæ* (compare Trans. Ent. Soc. 1878, p. 72); the palpi are similar in both genera, although more developed in *R. servia* and *R. obtusa* (not in *R. elegans*).

Walker's two genera *Liviana* and *Leida*, referred to this group, are specifically identical, and are "*Ephyrodes*" *scitilinea* of the same author, and the male of "*Thermesia*" *sigillata*.

#### Family THERMESIIDÆ.

##### ARGIDIA, Guénée.

102. *Argidia ortilia*.

*Phalæna ortilia*, Cramer, Pap. Exot. iv. pl. 344, fig. F (1782).

♂. Rio Javary, 4th December, 1874.

Probably the one example obtained by Dr. Trail is a slight variety of Cramer's species; anyway, it is too close to describe as distinct upon a single specimen: it is near to "*Hyphenaria*" *orphna* of Hübner. I am satisfied that,



if M. Guénée is right in referring his *A. palmipes* to *Argidia*, he is wrong in referring *H. ortilia* and *H. orphna* to *Hypenaria*.

103. *Argidia tarchon*.

*Phalæna tarchon*, Cramer, Pap. Exot. ii. p. 65, pl. 139, fig. C (1779).

*Azirista intracta*, Walker, Lep. Het. xv. p. 1639, n. 1 (1858).

*Argidia subrubra*, Felder, Reise der Nov. Lep. iv. pl. 118, fig. 28 (1875).

Juruana, Rio Purus, 24th September; near Santa Cruz, Rio Solimões, 9th December, 1874.

This species is so nearly allied to *A. calus*, of Guénée, that at first I hesitated as to whether or not it was distinct; yet this author refers it to *Thermesia*.

104. *Argidia obliterans*.

*Plaxia obliterans*, Walker, Lep. Het. xv. p. 1627, n. 6 (1858).

Ayrão, Rio Negro, 3rd July, 1874.

This species has all the characteristics of *Argidia*; it differs entirely in form and structure from *Plaxia*, the type of which is *P. macarea*.

The *Apistis* of Felder (part Hübner) represents typical *Plaxia*. I think it very doubtful whether M. Guénée's second species, *P. hypenoides*, is congeneric with *P. macarea*, as he states that the wings are angular: this is hardly true of Cramer's insect.

105. *Argidia subvelata*.

♀. *Hypernaria* (sic) *subvelata*, Walker, Lep. Het. Suppl. p. 1082 (1865).

♂. *Argidia aganippe*, Felder, Reise der Nov. Lep. iv. pl. 118, fig. 27 (1875).

Pupunha, Rio Juruá, 5th November, 1874.

The single example taken by Dr. Trail differs from Walker's type in the coloration of the undersurface of the primaries, the ground-colour being fuliginous-brown, with the reniform spot and a broad nebulous costal border, as far as the second or discal line, bright ochreous. The type has the ground-colour wholly ochreous, which seems also to be the case with Felder's example; Dr. Trail's specimen is, therefore, an interesting variety.

106. *Argidia rosacea*, n. sp.

Form and general pattern above of *A. tarchon*, but clay-coloured, washed with rose-colour, the lines towards the base and discoidal spots less distinct; wings below orange, washed with rust-red towards the apex and outer margin of secondaries; the primaries, with the exception of a broad costal streak and the internal border, washed with the same colour; apical border pearly-white, limited internally by a submarginal oblique brown-edged snow-white line; apical fringe white, remainder of fringe in all the wings brown; the extrabasilar and discal lines dark brown; discoidal spots barely indicated by brown dots; body ochraceous, legs orange; tibiæ of posterior legs broadly fringed; expanse of wings 1 inch 8 lines.

Uricuri, Rio Purus, 2nd October, 1874.

A single example of this pretty species, which seems most nearly allied to *A. palmipes*.

## ORTHOGRAMMA, Guénée.

The type of this genus, *O. coppryi*, was subsequently described by Walker as *Epitausa lætabilis*. As he had wrongly identified Guénée's species, this might have been considered a venial offence; but there is no excuse for his describing the male of the species regarded by himself as *O. coppryi* under the name of *Archana certa* and the female as *Azeta apicifera*; the latter and *Thermesia guttularis* are species of *Orthogramma*.

*O. vacillans* of Walker is identical with *Plaxia ingenua* of the same author, and allied to "*Thermesia*" *scalena* of Felder.

107. *Orthogramma pavescens*, n. sp.

Very pale olive-brown or stone-colour; wings crossed, from apex of primaries to middle of abdominal margin of secondaries, by a well-marked, externally whitish-edged, chocolate-brown, straight line; area immediately beyond this line washed with silver-grey; a discal series of connate black and white dots; fringe grey; primaries with barely-distinguishable discoidal spots; head and antennæ chocolate-brown; undersurface fuliginous-brown; primaries whitish towards apex and outer margin; a submarginal series of black dots; secondaries crossed by a

dark wavy discal line; apex dark: expanse of wings 1 inch 8 lines.

Rio Jutahi, 5th February, 1875.

Seems allied to *O. livescens* of Guénée.

108. *Orthogramma lurida*, n. sp.

Dull laky-brown; the wings crossed, from near apex of primaries to near abdominal margin of secondaries, by a straight dark-chocolate line; primaries crossed transversely near the base by a falciform dark-brown line; orbicular spot punctiform, white with brown edge; reniform represented by two slender opposed bisinuate brown lines; costal edge orange; fringe ochraceous; all the wings with an arched discal series of elongated ferruginous dots; secondaries with stramineous costal border; fringe dull clay-coloured; palpi and tibiæ of posterior legs chocolate-brown; tarsi blackish; wings below pale clay-coloured, suffused in the centre, and on external area of secondaries, with pale smoky-brown; a central dusky line, from costa of primaries to abdominal margin of secondaries; discocellulars blackish; primaries with a blackish dot in the cell; inner border pale and sericeous; body below whitish: expanse of wings 1 inch 9 lines.

Amazons.

Exact locality and date obliterated.

109. *Orthogramma ignilinea*.

*Thermesia ignilinea*, Walker, Lep. Het. Suppl. iii.  
p. 1046 (1865).

Ayrão, Rio Negro, 3rd July, 1874.

Dr. Trail only obtained one example of this rare species; the type is a broken specimen.

M. Guénée regards his genera *Sanys* and *Thiona* as nearly allied to *Orthogramma*; in their slender Geometrid-like bodies and antennæ they much more nearly approach *Thermesia*.

#### THERMESIA, Hübner.

Before proceeding to the enumeration of Dr. Trail's specimens, it is most important to correct the numerous errors, chiefly generic, which Mr. Walker has fallen into in this group of species.

*Thermesia sigillata* is a *Liviana*, *T. prospera* a *Capnodes*, *T. moniliaris* (= *Phurys arenosa*) a *Capnodes*,

*T. subrutilans* a *Capnodes*, *T. alacris* a *Liviana*, *T. torrida* a *Gerisa* (= *G. discerpta*), *T. ignilinea* an *Orthogramma*, *T. bipunctata* an *Ephyrodes*, *T. guttularis* an *Epitausa*, *T. croceiceps* a *Dagassa*, *T. generatrix* an *Orsa*, *T. arenacea* = *T. consocia* = *T. retrahens*,\* *T. vaga* an *Egnasia*, *T. despecta* a *Bithiasa*, *T. transducta* an *Azazia* (= *A. rubricans*), *T. simplex* an *Iluza* (= *I. decisa*), *T. finipalpis* a *Capnodes*, *T. reticulata* = *T. scitaria*.

Formerly I used to wonder at the facility with which Mr. Walker would settle the generic and frequently the specific location of any insect which was shown to him; I have ceased to wonder now.

110. *Thermesia gemmatalis*.

*Thermesia gemmatalis*, Hübner, Samml. Exot. Schmett. Zutr. figs. 153, 154.

var. *Remigia subsignata*, Walker, Lep. Het. xv. p. 1846 (1858).

Serpa, in the bush, 21st April, 1874.

AZETA, Guénée.

The type of this genus is *A. uncas*, which is identical with *Hypernaria* (sic) *continuens* of Walker.

111. *Azeta turbida*, n. sp.

Brownish-ochreous; the primaries washed with rosy-lilac, with a large almost semicircular castaneous costal patch between the cell and apex; three dusky transverse lines, the first straight, the second sinuated, the third oblique, and limited internally by a blackish-edged ochreous line; a discal series of white-speckled black dots; a blackish-edged white discocellular lunule; secondaries with two dusky lines, the inner one oblique, the outer straight and limited as in the primaries by a dark-edged ochreous line; a discal series of white-speckled black dots; fringe dusky; abdomen rose-tinted; undersurface fuliginous-brown, crossed beyond the middle by a dusky stripe; primaries with pale outer border; terminal joint of palpi, bases of tibial spines and tarsal joints cream-coloured: expanse of wings 1 inch 9 lines.

Mamiva, Rio Purus, 28th September, 1874.

Allied to *A. uncas*, only one example obtained.

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\* This species belongs to one of M. Guénée's genera, identified by Mr. Moore, who will probably shortly publish the correction.

## PANGRAPTA, Hübner.

112. *Pangrapta repugnalis*.

♂. *Pangrapta repugnalis*, Hübner, Samml. Exot. Schmett. Zutr. figs. 575, 576.

♀. *Azeta vampoa*, Guénée, Noct. iii. p. 360, n. 1834 (1852).

♂. *Azeta rhodogaster*, Guénée, l. c. n. 1835.

var. ♂, ♀, *Azeta mirzah*, Guénée, l. c. n. 1836.

♂. *Chabora undulifera*, Walker, Lep. Het. Suppl. iii. p. 1114 (1865).

♂. Serpa, in the bush, 22nd April, 1874.

I have no doubt whatever that the whole of the above are very slight variations of this variable and common species.

Walker has described the above as a second genus under the name of *Chabora* in the next volume of his Catalogue, p. 1184.

*Azeta quassa* has nothing to do with the genus, but is identical with *Massala dimidiata* (Suppl. iii. p. 977).

*A. hypopyrina*, of Felder, belongs to *Pangrapta*, as also his *A. leucoma*.

*A. obvertens* (= *Capnodes turtur*, Felder) belongs to the genus *Capnodes*.

## HELIA, Hübner.

113. *Helia calligramma*.

*Helia calligramma*, Hübner, Exot. Schmett. Zutr. figs. 157, 158.

*Homoptera* (?) *albirena*, Walker, Lep. Het. Suppl. iii. p. 891 (1865).

Pariti, Rio Purus, 5th October; Rio Sapó, 21st November, 1874.

Walker has wrongly referred this species to *Cænipeta*; it seems very close to *S. anguinna*, of Felder.

## METALECTRA, Hübner.

114. *Metalectra dotata*.

*Homoptera dotata*, Walker, Lep. Het. xiii. p. 1067, n. 32 (1857).

Serpa, in the bush, 24th April; Abacaxis, 12th May; Humayta, Rio Madeira, 23rd May; Rio Javary, 8th

December, 1874; Rio Jutali, 5th February, 1875; Serpa, 13th February, 1875.

Allied to "*Homoptera*" *quadrisignata*, and perhaps to "*H.*" *zonata*, previously noted under *Homoptera*. (See p. 40.)

115. *Metalectra* (?) *ypsilon*, n. sp.

Slaty-grey varied with testaceous, and with well-defined black discoidal spots; "reniform" crescent-shaped; a large pyramidal testaceous patch, interrupted by a black costal spot (so as to make a Y-shaped marking), immediately beyond the cell of primaries; a partly black-edged zigzag testaceous line from the Y-shaped marking to the inner margin; a submarginal series of black and testaceous dots; secondaries with the basal two-thirds testaceous, clouded with sienna-reddish and speckled with black; submarginal dots as in primaries; undersurface shining whity-brown, with indistinct traces of the markings of the upper surface: expanse of wings 1 inch 3 lines.

Tunantins, 23rd November, 1874.

Only one example obtained: the undersurface is not unlike that of "*Homoptera*" *zonata*.

"*Homoptera*" *scitior* = *H. perpussilla* may be referred to *Metalectra*.

MULELOCHA, *Walker*.

116. *Mulelocha extranea*.

*Homoptera* (?) *extranea*, Walker, Lep. Het. Suppl. iii. p. 881 (1865).

*Mulelocha frontalis*, Walker, l. c. p. 1103.

var. *Blanona dives*, Walker, l. c. p. 1106.

Mamiva, Rio Purus, 28th September; Sepatiny, 29th September; Rio Solimões, 17th October; Uruçaca, Rio Juruá, 9th November, 1874.

Allied to *Selenis compacta* of Felder, which may even be an extreme variety of it.

"*Homoptera*" *ocellata* is allied to *Mulelocha*\*, it certainly has nothing in common with *Homoptera*; it resembles, in the ocellation of the primaries, *Dialithis dioptica*, Walker (= *Cyclopteryx* (?) *macrops*, Felder).

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\* The palpi, however, are much thicker, shorter and curved backwards as in *Metalectra*; to this genus it would be most safely referred.

TYRISSA, *Walker.*

117. *Tyrissa* (?) *laminata*, n. sp.

Pearly-greyish, the primaries with the costal half washed with chocolate, basi-costal area of secondaries tinted with chocolate; numerous oblique white-edged black or chocolate irregular lines from the costal margin of primaries to abdominal margin of secondaries; fringe chocolate-brown, costal border of primaries spotted with whitish; under-surface whity-brown; wings crossed by rusty-brown dentate-sinuate parallel lines; external border purplish-grey, interrupted in the middle on the primaries; costal border white, interrupted by black and red-brown lines and dashes: expanse of wings 1 inch 1 line.

Manaos, 11th February, 1875.

Only one example was obtained.

118. *Tyrissa* *notiaphila*, n. sp.

Wings sordid sandy-yellow, irrorated with grey towards the base, crossed by four equidistant parallel dark-brown dentate-sinuate lines; costal edge black, dotted with white, external third irregularly slaty-grey, intersected by an irregular undulated whitish line; a marginal series of black dots; fringe white, dotted with grey; secondaries with the base white, a greyish curved submarginal grey stripe, bounded externally by a zigzag whitish line; external border whity-brown; a series of black marginal dots; body grey; primaries below greyish-brown, secondaries white, with greyish-brown costal area; discoidal spots and edge of outer margin black in all the wings, two parallel angulated blackish discal lines, the outer one white-bordered; body below white: expanse of wings 11 lines.

Ayrão, Rio Negro, 3rd July, 1874.

A single specimen was taken at light during rain.

APPHADANA, *Walker.*

119. *Apphadana* *liturata*.

*Apphadana liturata*, Walker, Lep. Het. Suppl. iii.  
p. 1094 (1865).

Parentins, 2nd April, 1874.

120. *Apphadana croceiceps*.

*Thermesia croceiceps*, Walker, Lep. Het. Suppl.  
iii. p. 1050 (1865).

Rio Jutahi, 3rd January, 1875.

Only a single female example: the type is a male.

DAGASSA, *Walker*.121. *Dagassa vulgaris*, n. sp.

Allied to *D. eupithecioides* and "*Selenis digna*", Felder; greyish-brown, with darker head and collar; wings suffused with silver-grey, crossed beyond the discoidal cells by an oblique tricoloured line, elbowed towards the costa of primaries, testaceous, with black internal and white external edge; an irregular discal series of whitish-edged black spots, the three last (near anal angle of secondaries) large and close together; a subconfluent marginal series of black linear spots; fringe pale testaceous, intersected by two slender parallel central brown lines and with brown external edge; primaries with a black-edged >-shaped white marking at the end of the cell; an irregular black line across the cell; costa beyond the middle black, dotted with white; secondaries with a black spot at the end of the cell; undersurface cinereous, body very pale; markings of the wings nearly as above, but the postmedian line dentate-sinuate, black, with pale external edge; discal black spots confined to the primaries; black line across the cell, only represented by the orbicular spot, which is black and punctiform; costa not black, but dotted beyond the middle with whitish: expanse of wings 11 lines.

São Antonio, Rio Negro, 5th July; Mamiva, Rio Purus, 28th September; Sepatiny, 29th September; Aruma, 4th October; Pariti, 5th October; Gavião, Rio Juruá, 10th November, 1874.

122. *Dagassa juruana*, n. sp.

Pale testaceous with a faint rosy tinge; a nearly-straight fulvous line, margined on both sides by black lines and bordered internally with whitish across both wings just beyond the middle; external area suffused (excepting a patch at apex and a second at external angle of primaries and the border of secondaries) with dark greyish-brown; an irregular discal series of pale-edged hastate black spots; a marginal series of depressed trian-



gular black spots; fringe intersected by a grey line; primaries with two or three black basal dots; an irregular black line across the cell; reniform outlined in black, with black centre; secondaries with annular black discocellular spot; undersurface pale sordid sandy-brownish; markings dusky, ill-defined: expanse of wings 11 lines.

Rio Juruá, 12th November, 1874.

Only a single example obtained.

The genus *Dagassa* chiefly differs from *Apphadana* in its longer and more slender palpi. "*Homoptera*" *diminutiva* of Walker may be added to the genus.

The type of *Blanona* (*B. selenisoides*) is *Menecina bifacies*.

The genera *Marcera* and *Daxata* should be placed near *Mulelocha*.

#### SELENIS, Guénée.

123. *Selenis sueroides*.

*Selenis sueroides*, Guénée, Noct. iii. p. 362, n. 1838 (1852).

Ilha Cuxinara, Rio Solimões, 13th October; Rio Juruá, 13th November, 1874.

#### RENODES, Guénée.

124. *Renodes* (?) *modesta*, n. sp.

Pale sandy-brown, greyish in certain lights, finely irrorated with black; wings with a slender undulated blackish marginal line uniting a marginal series of black spots; a postmedian oblique fulvous stripe, black-edged internally, diffused externally; an ill-defined whitish stripe just within the black edge; outer border sordid, limited internally by a sinuous dusky line; primaries with the discoidal spots small and white, the reniform being semi-transparent; a falciform blackish line across the basal area; a blackish costal dash just beyond the cell; undersurface sandy-whitish; primaries suffused with greyish in the centre; reniform white spot as above; margin of all the wings as above; palpi dusky: expanse of wings 1 inch 2—3 lines.

Sepatiny, Rio Purus, 29th September, 1874; Boaventura, Rio Jutahi, 26th January, 1875.

The primaries are rather more angular than in the only figured species of this genus, but the other characters seem to agree.

CAPNODES, *Guéinée*.125. *Capnodes sterope*.

*Phalæna (Noctua) sterope*, Cramer, Pap. Exot. iv. p. 40, pl. 302, fig. E (1782).

*Capnodes obliterata*, Walker, Lep. Het. xv. p. 1600, n. 1 (1858).

*Capnodes sufficiens* and "*Thermesia*" *prospera* are allied species; the latter is clearly very similar to *C. anhypa*, although distinct.

Aramia, Rio Purus, 4th October, 1874.

126. *Capnodes imitans*.

*Capnodes imitans*, Walker, Lep. Het. xv. p. 1606, n. 17 (1858).

*Capnodes exhilarans*, Walker, l. c. p. 1609, n. 22 (1858).

*Capnodes uncinata?* Felder, Reise der Nov. Lep. iv. pl. 119, fig. 10 (1875).

Rio Maubes, 5° 30' S., 29th April, 1874.

If Felder's insect is distinct, it is one of the most closely-allied species in existence; but I think there can be little doubt that it is a very slight variety of *C. imitans*.

127. *Capnodes pallida*, n. sp.

Whity-brown; wings covered with short fine black striations; an ill-defined curved discal series of black dots; a marginal series of black dots; primaries with a brick-red spot surrounded by a squamose black zone at base of inferior discoidal interspace; outer border irregularly greyish, dusky opposite to the end of the cell; secondaries with a bright brick-red spot, as in primaries; outer border irregularly greyish; primaries below smoky-grey, reticulated with blackish; an ill-defined discal series of black dots; fringe whitish; secondaries greyish-white, reticulated with blackish; discocellulars black; a dusky transverse postmedian streak, and an interrupted submarginal streak; outer border narrowly dusky; body sordid white: expanse of wings 1 inch 4 lines.

Boa Vista, Rio Jutahi, 1st February, 1875.

More nearly allied to the preceding than to any other species.

128. *Capnodes orbiculata*.

*Capnodes orbiculata*, Felder, Reise der Nov. Lep. iv. pl. 118, fig. 14 (1875).

Boa Vista, Rio Purus, 12th September, 1874.

129. *Capnodes sobria*.

*Thermesia sobria*, Walker, Lep. Het. Suppl. iii. p. 1044 (1865).

Rio Juruá, 3rd November, 1874.

This species is allied to *C. obvertens* and *C. lineus*, but the latter appears to be nearer to *C. irene* in its black subapical costal patch.

† 130. *Capnodes senilis*, n. sp.

Silver-grey; an irregular band, composed of two nearly parallel crinkled chocolate-brown lines, just beyond the middle; discoidal spots outlined in chocolate; a discal series of triangular black dots, followed by a zigzag chocolate line; a nearly marginal series of black dots, united by a dusky zigzag line; primaries crossed near the base by an irregular blackish line; undersurface very pale, discoidal spots black, punctiform; primaries silvery-brown, several costal white dots beyond the middle; a marginal series of black dots; secondaries white with central grey crinkled line and broad grey border; marginal dots as in primaries: expanse of wings 11 lines.

Rio Jutahi, 5th February, 1875.

131. *Capnodes indigna*, n. sp.

Pale earthy-grey, with a very feeble lilacine tint; wings crossed in the centre by a slightly oblique wavy pale line dividing the discocellular spot (on each wing), which is large and ferruginous, with interrupted darker edge; a marginal series of black dots; primaries with a ferruginous spot at base of costa; an irregular ferruginous band, intersected by a wavy pale line, across the basal third; a ferruginous costal spot, divided by the central line, above the reniform or discocellular spot; a small subapical quadrate ferruginous costal spot; costal margin white-dotted beyond the middle; secondaries with a large black spot in the cell, touching the discocellular spot; faint traces of two blackish zigzag discal lines, the inner one of which becomes sharply defined as an oblique black line across the abdominal border; palpi white internally, tarsi above

black, with white terminations to the joints; undersurface without ferruginous markings or pale lines; discocellular spots indicated by two parallel black lunules; body below whitish: expanse of wings 11 lines.

Septatiny, Rio Purus, 29th September, 1874.

*Capnodes indigna* somewhat resembles *Bleptina pithosalis*, Wlk. (= *Megatomis ferrilunalis*, Wlk.), and the closely-allied *B. spurcatais* of the same author; these two species would be, in my opinion, better placed near *Epizeuxis lituralis*.

132. *Capnodes bistriata*, n. sp.

Pale chocolate-brown, vividly shot with violaceous; a marginal series of whitish-edged subconfluent semicircular black spots; an irregular discal series of pale-bordered confluent olivaceous spots; two irregular yellow-edged olivaceous lines, the inner one confined to primaries, the outer one angulated on these wings towards the costa; discoidal spots yellow, with olivaceous borders; palpi whitish; undersurface sordid-white, wings shot with bronzy-cupreous; borders rather broadly grey; discocellulars outlined in grey; primaries greyish; costa beyond the cell white-dotted; secondaries crossed by a central grey line: expanse of wings 11 lines.

Rio Negro, 17th June; Rio Juruá, 13th November, 1874; Boa Vista, Rio Jutahi, 1st February, 1875.

Seems allied to *C. pyralicolor*, but smaller, and darker above.

133. *Capnodes lacteigera*, n. sp.

Brown, densely mottled with dark-grey and shot with lilacine; wings with rather pale fringe and margin; a marginal series of depressed subtriangular black dots; a zigzag discal series of blackish spots; a slightly-irregular fulvous postmedian stripe, commencing near costa of primaries as the continuation of an oblique milk-white dash, limited internally, throughout its entire length, by a series of short black-curved virgulæ and dots; discoidal spots slightly tinted with fulvous, with black margins, the "reniform" 3-shaped; an irregular black-edged and partly fulvous-bordered milk-white band across the basal third of primaries; palpi greyish-brown; wings below with black marginal dots; primaries greyish-brown, with cupreous reflections; discoidal spots small and black; two

curved parallel greyish discal lines; base whitish; secondaries sordid-whitish, with cupreous reflections; a black discocellular spot; a curved discal line and the outer border greyish-brown; a submarginal dusky stripe limiting the border; body creamy-white: expanse of wings 1 inch 1 line.

Near Xibaru, Rio Negro, 25th June, 1874.

Apparently allied to *Phalæna striaturia* of Cramer, wrongly referred, by M. Guénée, to *Palindia*.

134. *Capnodes mundicola*.

*Capnodes mundicola*, Walker, Lep. Het. Suppl. iii. p. 1075 (1865).

Fuliginous-brown; wings crossed by two black-edged flesh-coloured lines, zigzag towards costa of primaries; discoidal spots small and black; a black-edged zigzag pinky-whitish marginal line, and a submarginal series of black-edged spots of the same colour; a dusky transverse line between the two flesh-coloured lines, externally (and especially upon the secondaries) edged with whitish; outer border irregularly pale; abdomen whitish at base; under-surface paler, the outer borders very pale, limited internally by a dusky band; a central dusky line; discocellular dusky: expanse of wings 1 inch 4 lines.

♂. Obydos, 8th March; ♀. Mouth of Parana mirina de Uraria, 5th June, 1874.

Only a single pair obtained; the male is rather darker than the female: *C. linula* seems to be allied to this species, which (excepting in its broader primaries and less strongly-pectinated antennæ) greatly resembles the genus *Bithiasa*. Walker's description is so incomplete that I have had some difficulty in identifying this species.

Subgenus\* *ARUGISA*, Walker.

135. *Capnodes turbata*, n. sp.

Primaries slaty-grey, with a faint violaceous shot; a curved and almost semicircular broad belt (covering the

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\* I disapprove of making subgenera, but when made I prefer to adopt rather than ignore them. *Arugisa* is structurally like *Capnodes*, but differs somewhat in coloration.

basal two-fifths with the exception of the costal border), a quadrate patch immediately beyond the reniform spot, an apical spot, a submarginal lunulated line, and the edges of the marginal black dots, tawny; four parallel zigzag oblique grey lines in pairs; a sigmoidal black line beyond the middle; secondaries tawny with greyish subcostal area; two parallel triangulated central blackish lines; a dusky angular subbasal line; two parallel submarginal greyish lines; palpi slaty-grey; collar dark fulvous; thorax fulvous; abdomen grey; undersurface creamy-white; pectus and undersurface of legs snow-white; tarsi above black with white edges to the joints; primaries with greyish fuliginous costal border and external half, the latter limited internally and crossed by two parallel dusky stripes; marginal black dots as above; secondaries with a minute blackish discocellular annulus; a dusky line beyond the middle, a dusky submarginal streak; outer border greyish-fuliginous; marginal black dots as above: expanse of wings 1 inch 1 line.

Rio Jutahi, 5th February, 1875.

Only a single example.

*C. subrutilans*, *C. consocia* and *C. finipalpis* belong to this section of the genus.

#### GERISA, *Walker*.

##### 136. *Gerisa anyx*.

*Capnodes anyx*, Guénée, Noct. iii. p. 378, n. 1866 (1852).

*Capnodes rufinans*, Walker (nec Guénée), Lep. Het. xv. p. 1603, n. 7 (1858).

Guajaratuba, Rio Purus, 11th September; Rio Juruá, 26th October; Gavião, Rio Juruá, 10th and 12th November; Tunantins, 23rd November, 1874.

If I have rightly identified this species, Guénée's type must have been a female (not a male); the male is quite unlike that sex of the nearly-allied *G. rufinans* ( $\delta$  *G. discretus* =  $\delta$  *Thermesia torrida*, Wlk.), being dissimilar in form from the female, the primaries much rounded with very convex inner margin, the discal line terminating on this margin in a conspicuous white spot, the antennæ very strongly pectinated.

*G. anyx* seems allied to "*Capnodes*" *subguttata* of Felder.

Of other species placed under *Capnodes* the following may be removed or sunk as synonymes:—

*Capnodes melanea* is probably a female *Pangrapta*, *C. serplagiata* is *Phalæna pueritia* of Cramer and belongs to *Capnodes*; *C. rotundifera* is a *Gerisa*.

#### PARANYMPHA, Cramer.

Chiefly differs from *Capnodes* in its more solid and compact appearance, the primaries with longer and straighter costal margin and more acute apex. Type, *Phalæna (Paranymphe) toxea*, Cramer.

#### 137. *Paranymphe albocostata*, n. sp.

Clay-coloured, wings crossed by an irregularly-arched white-dotted dusky line; a submarginal series of small black spots and a marginal series of black dots; primaries with snow-white costal edge; a transverse dusky stripe crossing the wing nearly at the end of the cell; a minute black dot enclosed in an ill-defined dusky 3-shaped character at the end of the cell; secondaries with a circular purplish spot speckled with blue at the end of the cell; head dark brown; anterior edge of collar dark brown, followed by a white transverse stripe; wings below sandy-ochraceous with black discoidal spots, a dusky discal streak; submarginal black spots and marginal dots as above; body below whitish, legs and palpi variegated with ochraceous, ferruginous, black and white: expanse of wings 1 inch 6 lines.

Boaventura, Rio Jutahi, 24th January, 1875.

Only a single specimen was obtained.

#### HYPENARIA, Guénée.

Wrongly spelt *Hypernaria* in all Walker's descriptions; before noting Dr. Trail's captures I shall have to point out some of this author's mistakes:—

*H. ortilia*, *orphna*, *tarchon* and *subvelata* may be referred to *Argidia*, *H. patula* is *Latebraria contacta*, *H. sublineata* is an *Amphigonina*, *H. continuens* is *Azeta uncas*, and *H. punctulosa* is a small *Lacera*; *H. interponens* is probably *H. roseispila*.

138. *Hypenaria pyrochila*, n. sp.

Red-brown washed with lilacine, particularly towards the costa and base of primaries; wings crossed before the middle by an irregularly dentate-sinuate brown line, and beyond the middle by an oblique white-edged brown line, interrupted by scarlet dots upon the veins, retracted (and oblique dentate-sinuate above the elbow) towards costa of primaries; a pale zigzag submarginal line, dotted internally with white; a marginal pink-bordered crinkled black line; extreme margin and base of fringe scarlet; fringe externally dark brown; primaries with an irregularly-undulated brown line towards the base, and between it and the second line the black-edged pale greenish-white orbicular spot; reniform confluent with a trifid patch separated by the median veins, limited by an undulated blackish line; the lower portion of the reniform part pale greenish, the portion divided by the median veins sandy-yellow; secondaries with a subgeminat ovoid cream-coloured spot at the end of the cell; head and thorax greyish; wings below ochraceous, washed (excepting at base) with reddish, crossed from just before the middle by three curved grey lines, the centre one darkest; discoidal spots small and blackish; body ochraceous, external surfaces of palpi and legs more or less scarlet: expanse of wings 1 inch 9 lines.

Rio Juruá, 7th November, 1874.

Seems allied to *H. leucospila*, *chlorospila* and *angusta*.

I have three times gone through the whole of Cramer's plates and indices, but have failed to find any species described or figured by him under the name of *H. binocula*. M. Guénée, however, declares that he describes the species from the figure; therefore, if we adopt Walker's view and call Guénée the author, we have no alternative but to suppose that he described a mirage.

139. *Hypenaria triocellata*, n. sp.

Allied to the preceding, but the markings less defined, excepting the trifid continuation to the reniform spot, which is replaced by three unequal increasing black blind ocelli with whitish irides: expanse of wings 1 inch 11 lines.

Mouth of Rio Jutahi, 18th January; Santarem, 4th February, 1875.



Nearly allied to *H. rubripalpis*, *Ctypana guttiluna*, and the scarcely-differing *Hyphenaria cypriensis*.

PLAXIA, Guénée.

140. *Plaxia mormon*.

♂. *Apistis mormon*, Felder, Reise der Nov. Lep. iv. pl. 98, fig. 16.

Uttary, Rio Purus, 30th September; Uruçaca, Rio Juruá, 9th November; Rio Juruá, near the mouth, 14th November, 1874.

The female is more uniform in tint and paler than the male, its abdomen also is not red: the species is allied to *P. macarea*.

141. *Plaxia maculigera*, n. sp.

Allied to the preceding; fuliginous-brown, striolated with black and irrorated with pale lilac; a black-edged oblique lilac line beyond the middle from near the abdominal margin of secondaries to near the apex of primaries, the disc immediately beyond this line washed with lilac; traces of a sinuated "extrabascular" brown line; primaries, with a nearly-circular unequally-bifid bright orange spot, cut by the second median branch; costal margin ochraceous; secondaries with an angular series of black dots on the disc; antennæ, crest and margins of collar pale brown; termination of abdomen and sides of terminal segments ochraceous; tarsi and venter sandy-yellowish; wings below uniform sericeous greyish-brown, having almost a greasy appearance, striolated with darker brown and crossed by two parallel dark-grey lines; primaries with ochreous costa: expanse of wings 2 inches 2 lines.

♂. Serpa, 13th February, 1875.

This species agrees in coloration with "*Thermesia*" *scalena* of Felder.

Felder's "*Thermesia*" (?) *infumata*, which is evidently a slight variety of Walker's "*Hypernaria*" *anisospila*, seems to me to agree with Hübner's *Apistis* (the type of which is *A. fellearis*); *Plaxia subducta* and *P. spiloleuca* of Walker may also be placed in the same genus; they are closely allied to *H. anisospila*; *Hyphenaria metastigma* is evidently Hübner's *A. fellearis*. I will not attempt to decide whether *Hyphenaria* and *Apistis* are sufficiently

distinct to be regarded as different genera until I have to re-arrange the whole of the *Noctuïtes*, and can form a correct estimate as to what characters are sufficient in this tribe to constitute a generic distinction.

EMPELATHRA, *Walker.*

To this genus I propose provisionally to refer *Orthogramma vacillans* = *Plaxia ingenua* and the following species allied to it.

142. *Empelathra scalena.*

*Thermesia scalena*, Felder, *Reise der Nov. Lep.* iv. pl. 118, fig. 13.

Lake Cararaucu, 17th April; Marapatá, Rio Negro, 30th December, 1874.

*E. scalena* differs from *E. vacillans* exactly as *Plaxia maculigera* does from *P. macarea*.

143. *Empelathra amplificans.*

*Empelathra amplificans*, Walker, *Lep. Het.* xv. p. 1633, n. 1 (1858).

Paricatuba, 17th October, 1874.

This is a rare species in which the apex of primaries is obliquely truncated, the costal margin is shorter than in the other two species which I have referred to the genus.

V. *On some Coleoptera from the Hawaiian Islands.*  
By D. SHARP.

[Read March 5th, 1879.]

THIS paper contains descriptions of thirty new species of beetles found by the Rev. T. Blackburn in the Sandwich Islands. A like instalment, which I hope shortly to offer to the Society, will complete the descriptions of the discoveries made by Mr. Blackburn up to the present time in the islands. The species described are most of them very minute insects, and this, unfortunately, will create a great difficulty in ascertaining at present their nearest relatives, for it is an undoubted fact that our knowledge of the Micro-Coleoptera is still quite rudimentary, except in regard to European and North American forms.

I have felt compelled to establish four new generic names, viz., *Omicrus* (*Hydrophilidæ*), *Monanus* (*Cucujidæ*), *Antilissus* (*Colydiidæ*) and *Propalticus*, this latter being so peculiar a form that I am quite doubtful what its affinities will ultimately prove to be, although I have temporarily placed it with the *Mycetophagidæ*.

*Clytarlus microgaster* is a most remarkable insect, by reason of the excessive reduction in size of its hind body or abdomen, which in the male sex is reduced to a small appendage, reminding one of what exists in some of the parasitic *Hymenoptera*. I have not seen the female of this interesting creature, and expect the hind body must be at any rate somewhat larger than in the male. I almost think I might cite this fact as a support of the suggestion I made (*Trans. Ent. Soc. Lond.* 1878, p. 15), that the paucity of individuals of most species of beetles in these islands is possibly due to a diminution in the reproductive powers of the species, owing to their long-continued isolation, and the consequent absence of that amount of breeding between slightly-different forms or races which is so favourable to fertility of organisms. The minute size of most of the species of these islands may perhaps also

be partly due to similar biological influences. Indeed it is, I believe, owing to deficiencies in the assimilative and reproductive powers that the organisms composing insular faunas (*i. e.*, long isolated and small communities) become so readily exterminated on the occurrence of any change in the conditions of their lives, or on their having to compete with introduced strangers.

Of the anomalous *Proterhinus*, Mr. Blackburn has discovered an additional series of species, including some extreme forms, which render it highly probable that other species will be brought to light. Meanwhile, I am so fortunate as to be able to give some remarks of Dr. Leconte on the genus, based on an examination he kindly made of *P. vestitus*. He says, in a letter to me, "It seems to me to represent a family easily distinguished from all others of the *Rhyncophora*, and not to have any affinities outside of that series. It differs from all of them by the absence of the first tarsal joint. The form of the dilated joint as well as its vestiture beneath indicates that it is the normal 3rd joint, and therefore it must be the 1st joint that has become obsolete. The mouth organs and the ventral segments are as in many *Curculionidæ*, while the sculpture of the undersurface of the beak resembles that of *Eupsalis* ♂. It differs from *Anthribidæ* by the absence of labrum, covered pygidium, structure of mouth, and many other respects, though resembling that family in the beak and antennæ. In order to complete the investigation, I took up *Aglycyderes*, and studied carefully *A. setifer*. I think the Rhyncophorous affinities are very feeble, and that it belongs rather with the clavicorn series, having relationships with *Colydiidæ* more than with any other family. It differs from that family, especially by the tarsi and the maxillæ with but a single lobe. The head above and beneath does not resemble any *Rhyncophore*, but does look very much like certain of the first tribe of *Colydiidæ* (*Anchomma*, *e. g.*), the insertion of the antennæ under the frontal margin is also not Rhyncophorous. *Aglycyderes* has also perfectly-developed epipleuræ, the flanks of the prothorax are separated from the pronotum by a distinct margin, and there are quite obvious traces of prosternal sutures. These characters do not exist in *Rhyncophora*, and the last two are variable in *Colydiidæ* according to tribe and genus." Dr. Leconte further adds, "Should you wish to print and comment upon any of these views, do so without hesitation, as all I wish is to provoke dis-

cussion, until we or some one else puts these troublesome synthetic forms where they will be least out of place."

Dr. Leconte's opinion is of such great importance, and the question of the isolation of *Proterhinus* is of so much interest in relation to the affinities of the Hawaiian fauna, that I shall avail myself of his invitation to make some additional remarks on the question.

It will be gathered from what I have above quoted that he agrees with me in locating *Proterhinus* as an isolated and little developed type of *Rhynchophora*, while he also confirms the opinion I expressed (*Ann. and Mag. Nat. Hist.*, July, 1876, p. 28), before Mr. Blackburn's researches had brought *Proterhinus* to light, that the relationships of the then unique *Aglycyderes* were with the *Colydiidæ*. It will be seen, however, that, on the other hand, the Philadelphian savant does not at all support my subsequent proposal (*Trans. Ent. Soc. Lond.* 1878, pp. 16, 21) to unite *Aglycyderes* and *Proterhinus* in one family, but, on the contrary, he leaves it to be inferred that there is no real affinity between the two genera, and on this point, after careful renewed examination of the insects, I feel compelled to differ from him.

It is, however, such a bold thing for me to dissent from a carefully-formed opinion of Dr. Leconte on such a point, that I must, before stating my reasons, take the opportunity of quoting the dictum of another most accomplished naturalist, the late T. V. Wollaston. In a letter I received from him a few days before his lamented decease, he acknowledges the arrival of a pair of *Proterhinus vestitus* I had sent to him, and says, "Your new member of the *Aglycyderidæ* is a most wonderful beast, quite one of the most extraordinary I have ever seen, but there is no mistaking, I think, its affinities." Although Mr. Wollaston speaks as if he had not made any complete examination, it will be seen that he was quite inclined to agree with me on the point in which Dr. Leconte differs from me.

I consider *Aglycyderes* and *Proterhinus* to be allied, because they have in common a structure of the tarsi, which out of the whole enormous order of *Coleoptera* is peculiar to them, and because they agree in all other points except those which Dr. Leconte has mentioned, and of some of which I think he has over-estimated the importance. For instance, though there is a great difference in the structure of the head in the males of the two forms, yet, on comparing together the females, I have

been unable to see any difference of importance between the two, and the insertion of the antennæ in this sex is likewise extremely similar. It is true that the upper surface of the prothorax in *Aglycyderes setifer* is differentiated, although somewhat indefinitely, from the flanks by a series of projecting serrations, and that in *Proterhinus* nothing but the rudiments of such a separation are to be detected, but I am unable to consider this as of extreme importance; for in *Aglycyderes Wollastoni* the separation alluded to is considerably more indefinite than it is in *A. setifer*; while, on the other hand, although such separation is excessively rare in the *Rhyncophora*, yet it is sometimes distinct, and, in fact, I have before me, as I write, a highly-peculiar genus of *Anthribidæ* (belonging, therefore, of course to the *Rhyncophora*), in which this lateral border is as highly developed along the whole side of the prothorax from the anterior to the posterior angles, as it is in the average of the *Coleoptera*, and far more than it is in *Aglycyderes*. Again, there exist, as stated by Leconte, in *Aglycyderes setifer* slight traces of two prosternal sutures, extending outwards from the front coxal cavities; but yet in *A. Wollastoni* I fail to trace them more certainly than I think I can in *Proterhinus vestitus*; and in *Anthribidæ* sutures extending from the coxal cavities to the sides of the thorax may often be seen much less obliterated. On the other hand, I quite fail to see anything in the structure of the head and thorax in *Aglycyderes* which does not accord with Dr. Leconte's definition of *Rhyncophora*, viz., "Rhyncophorous *Coleoptera* are those in which the posterior lateral elements of the head and prothorax coalesce on the median line of the undersurface of the body, so as to unite by a single suture." (Proc. Am. Phil. Soc. XV. 1876, p. xi.)

Nevertheless there does exist an important difference between *Proterhinus* and *Aglycyderes*, as to the direction which the sexual differentiation of the head has taken. In one of the sexes of *Proterhinus* the head is elongated in front into a well-marked beak, while in that sex of *Aglycyderes* in which the head is most extended, the extension is rather in the transverse than in the longitudinal direction. When we recall how persistent a character the beak-like extension of the head is in the *Rhyncophora*—existing in a well-marked form in all the species except in certain *Anthribidæ*—much importance must clearly be attached to this character.

The impression left on my mind with regard to these insects may be thus summed up:—

1. In *Proterhinus* and *Aglycyderes* we are probably dealing with very primitive *Coleoptera*, such, in fact, as existed before the present great development of the highly-differentiated families of the order had occurred.

2. That *Aglycyderes* and *Proterhinus* may be treated as one family, to be placed at the commencement of the families of *Rhyncophora*.

3. That the distinctions between the two forms are of such a nature that they may be justly treated as representing two ultimate divisions of one family: *i. e.*, the two forms remain ununited through a considerable number of repeated and progressively more important syntheses, till the synthesis of family value is reached, when they unite to form the family *Aglycyderidae*.

It may not be amiss here to remark that the few species constituting this primitive family are all members of insular faunæ: *Aglycyderes setifer* being confined to the Canary Islands; *A. Wollastoni* to New Zealand; and the species of *Proterhinus* to the Sandwich Islands.

## HYDROPHILIDÆ.

### OMICRUS (new name).

*Omicrus brevipes*, n. sp. Minutus, latus, subrotundatus, parum convexus, subtus rufescens, opacus, supra nigropiceus, nitidus, nudus, capite anteriori rufescente, pedibus rufis, antennis palpisque testaceis, illis clava fusca; capite thoraceque fere lævigatis, hoc margine laterali tenuissimo; elytris parum subtiliter haud dense punctatis, stria suturali tantum posteriori impressa, versus latera parum distincte seriatim punctatis. Long.  $1\frac{1}{4}$  mm.; lat. 1 mm.

This little insect has perhaps at first sight more the aspect of a *Cyclonotum* than of any other *Hydrophilid*; it is among the smallest of the family, only attaining the size of a moderate *Limnebius*: the very short, and rather stout middle and hinder tarsi, the joints of which are compressed and adjusted to one another, but are not, I believe, fitted for swimming, are characteristic.

Oahu; widely distributed, but not common. No. 236

of Mr. Blackburn. The structural characters which have justified the formation of a new generic name for this species may be enumerated as follows:—

Head short and broad, truncate and depressed in front, so that the small eyes project as subangular projections; the short very broad labrum quite exposed. Antennæ 9-jointed, the 1st joint elongate, the 2nd rather short, the three following very small, short and equal, the 6th joint short and strongly transverse, closely applied to the base of the 7th joint, this and the 8th and 9th joints forming a large very compact club. Maxillary palpi formed much as in *Megasternum*, the 2nd joint being a good deal incrassate, the 3rd and 4th slender, the latter acuminate. Prosternum short, and unarmed; intermediate coxæ approximate, separated by the greatly-elevated mesosternal lamina; this lamina is linear, and perfectly on a level with the metasternum, to which it is amalgamated without any trace of suture remaining; the metasternum not in the least carinate. Legs short, the tarsi extremely short, the basal joint of the posterior ones quite short, and not easily distinguished, the 2nd longer than the 3rd.

I am quite unable to find any near ally for this minute insect; it must be located at present in the *Hydrobiides* of Lacordaire between *Anacæna* and *Volvulus*, but it is widely separated from each of those genera. In respect of its hind tarsi it is more approached by *Chatarthria*, which is in other respects widely different.

Only three other species of *Hydrophilidæ* have been yet found by Mr. Blackburn, they are—

1. *Hydrophilus semicylindricus*, Esch.

This species should at present be located as a member of the genus *Hydrobius* of the Munich Catalogue: it departs, however, in some important particulars from our European species; the posterior and intermediate tarsi are furnished above with long ciliæ; the prosternum is finely carinate along the middle, and the undersides of the femora are polished, there being on the front and middle ones merely a small punctate space near the trochanter. In these respects it agrees with the one or two Australian allies, from which it is, however, as a species, abundantly distinct. In the form and development of the mesosternal protuberance the Hawaiian species agrees with our Euro-



pean *Hydrobius convexus*, Brullé, in which species there is likewise a slight ciliation of the hind tarsi.

Found in Oahu, and probably in other islands of the group.

2. *Cyclonotum subquadratum*, Fairm.

This species was described by Fairmaire from specimens from Tahiti. I have had no opportunity of comparing Hawaiian with Tahitian individuals.

This species is common in vegetable refuse.

3. *Spharidium abdominale*, Fab. (*Dactylosternum*, Woll.)

This widely-distributed insect is one of the commonest beetles at Honolulu, where it is found, as elsewhere, among rotting vegetables.

## NITIDULIDÆ.

### BRACHYPEPLUS (Munich Cat.).

*Brachypeplus tinctus*, n. sp. Haud latus, parum convexus, tenuiter pubescens, testaceus, viridi-tinctus, elytris læte viridi-æneis, abdomine medio fusco; capite dense punctato, oculis magnis; prothorace transversim convexo, anterius truncato, dense punctato, dorso pone medium bi-impresso; elytris subtiliter seriatim punctatis, interstitiis adhuc subtilius punctatis, angulo externo late rotundato; abdomine nitido, crebrius sat fortiter punctato. Long.  $3\frac{3}{4}$  mm.; lat.  $1\frac{2}{3}$  mm.

The antennæ are of a dusky yellow colour, with the club large. The eyes are very large and reach to the back of the head, the upper surface of which is densely and distinctly punctured. The thorax is narrower than the elytra, nearly truncate in front, with the anterior angles extremely rounded; the sides are rounded, but become a little less curved near the hind angles, which are rather obtuse; the width is slightly greater at the base than at the front; the punctuation is dense and distinct, and is finer and closer on the front parts than it is behind, and has a slightly rugose appearance on the disc; just behind the middle are two distinct impressions. The scutellum is large. The elytra are long, and leave exposed only the two apical segments and just the hind margin of the preceding one; the sides are not explanate, and the hind

angles are extremely rounded; the sculpture consists of series of somewhat indistinct punctures, with a scanty and extremely fine punctuation on the interstices. The punctuation of the exposed dorsal segments is rather close and distinct.

Three specimens have been found in flowers in the mountain forests of Oahu; the one sent me by Mr. Blackburn was numbered 191.

This specimen is no doubt a male; the last dorsal plate is emarginate and the last ventral truncate. There is a distinct but short, exposed supplementary segment.

In company with these three individuals Mr. Blackburn found two others, which he considers to be the female. One of these he has sent as No. 190; it has the head narrower, and the head and thorax much less closely punctured. The elytra are rather shorter, and leave exposed a greater portion of the hind body, and the exposed dorsal segments are much less punctured. The apex of the last dorsal segment is depressed in the middle, but not emarginate, and there is no supplementary segment visible. Mr. Blackburn is probably right in considering this to be the female of the male above described; still the distinctions are of such a nature that I have not thought it right to treat the two forms as positively the sexes of one species at present.

*B. tinctus* is interesting as making a considerable approach to *Gonioryctus*, from which, however, it still remains distinct by the finely-faceted eyes, and the much less elongated lobes of the third tarsal joint. It should be placed at the head of the Hawaiian *Brachypepli*, before *B. discedens*.

*Brachypeplus explanatus*, n. sp. Latiusculus, parum nitidus, ferrugineo-testaceus, vix variegatus, antennis fuscis, articulis 1° et 2° testaceis; oculis parvis; thorace magno, antrorsum quam ad basin magis angustato, dense fortiterque punctato, disco profunde quadri-impresso, lateribus explanatis; elytris inæqualibus, thorace haud sesqui longioribus, lateribus explanatis, posterius sat angustatis, angulo externo perparum rotundato; abdomine acuminato, fortiter, sed parum argute et profunde, punctato. Long.  $4\frac{1}{4}$  mm.; lat.  $1\frac{2}{3}$  mm.

The eyes are small, so that the post-ocular lobe is large; the thorax is largely developed, its anterior angles

are very rounded and indistinct, the narrowing of the sides behind the middle is abrupt and well-marked, the hinder angles are nearly rectangular. The alternate interstices of the elytra are a good deal more elevated than the others, but this character is rendered less striking by the inequalities of the surface.

This species is allied to *B. inæqualis*, from which, however, it is very easily distinguished by its smaller eyes, coarser sculpture, and the very explanate sides of the elytra, and their less rounded outer angles.

Two individuals have been found by Mr. Blackburn on the mountains near Honolulu; the one sent home was numbered 189; it exhibits a very distinct exerted apical segment, and is probably a male.

*Brachypeplus protinoides*, n. sp. Haud latus, convexiusculus, ferrugineo-testaceus, supra æneo-tinctus, parcius minus breviter pubescens, sat nitidus; capite thoraceque parce fortiter punctatis, hoc vix transverso; elytris obsolete seriatim punctatis, interstitiis vix conspicue punctulatis, lateribus nullo modo explanatis, angulo externo late rotundato. Long. 3 mm.; lat.  $1\frac{1}{3}$  mm.

This species is somewhat allied to the preceding, but is smaller and more convex, and the eyes are smaller; the excessively indistinct sculpture of the wing cases, and the unusually convex form will readily distinguish it from its allies. From its form it has some resemblance to *Proteinus*, a genus of *Staphylinidæ*.

The only individual I have seen is in very bad condition, and shows no supplementary apical segment. It was found by Mr. Blackburn in the flowers of the koa tree, at an elevation of about 5,000 feet, on Halea Kala.

## CUCUJIDÆ.

### MONANUS (new name).

*Monanus crenatus*, n. sp. Ferrugineus, elytris pedibusque parum pallidioridus, angustulus, fortiter punctatus; prothorace subquadrato, posterius leviter angustato, lateribus æqualiter crenulatis, fortiter punctato; elytris fortiter seriatim punctatis, pube suberecta, sat elongata vestitis. Long.  $2\frac{1}{8}$  mm.; lat.  $\frac{3}{4}$  mm.

Antennæ about as long as head and thorax, rather stout,

1st joint but little different from the following ones, being only slightly longer and thicker than the 2nd; joints 2—8 differing but little from one another, each about as long as broad; joints 9—11 distinctly larger than the preceding ones, not transverse, the 11th rather the largest. Head coarsely punctured, not broad, a little narrower than the thorax. Thorax a good deal narrower than the elytra, nearly as long as broad, distinctly narrowed behind, the sides crenulate, it is coarsely punctured, and finely and indistinctly pubescent. Elytra rather slender, with rows of coarse punctures, and with a fine but rather elongate pubescence.

Found rarely in decaying vegetable matter on the mountains of Oahu; sent as No. 204.

I have seen but a single individual of this species; it cannot be placed in any established genus, and as its position is certain, I have given it a new generic name. Its structure is similar to that of *Psammæchus*, but the basal joint of the antennæ is less developed, and the apical joint of the maxillary palpi is not dilated, but acuminate. The tarsi have the 2nd and 3rd joints strongly lobed beneath, and the 4th joint small. The position of the genus at present is clearly therefore between *Psammæchus* and *Telephanus*. In appearance the species may be described as intermediate between *Silvanus* and *Corticaria*.

## COLYDIIDÆ.

### ANTILISSUS (new name).

*Antilissus aper*, n. sp. Elongatus, angustulus, parallelus, subcylindricus, fusco-ferrugineus, opacus, parcius hispidus; prothorace elongato, sulculis angustis, profundis, connexis, ornato; elytris punctato-sulcatis, interstitiis angustis; antennis pedibusque ferrugineis. Long. 3—4 mm.; lat. 1 mm.

Upper surface of head parabolic in form, the eyes continuing the outline of the sides, the posterior part bearing very flat tubercles, the anterior part very indefinitely sculptured. Thorax elongate and narrow, considerably longer than broad, nearly straight at the sides, the front margin with a rather deep, narrow sinuation on each side, so that the anterior angles are prominent; the surface is covered with flat tubercles, and peculiar depressions; the

depressed parts are without sculpture, one of them runs close to the side, with which it is parallel, another less definite one runs along the middle, and another exists between the central and the lateral one; these grooves are connected together, in an irregular manner, in the transverse direction, so that the rough surface is broken up into several irregular isolated portions, which bear a few short erect setæ, the sides also bear setæ. The elytra are elongate, and are marked by grooves separated by narrow interstices; these grooves bear deep punctures, or small depressions, separated from one another by small spaces only, and from these spaces spring the short erect setæ. The undersurface is coarsely punctured. The tibiæ are armed externally with fine setæ.

I have received four individuals from Mr. Blackburn, but have no information about them.

The species cannot be placed in any established genus, so that I have made a new generic name for it. Its position should be between *Bupalia* and *Cicones*, though in form and sculpture it is nearer to *Lado Jelskii*. The following are its characters:—

Antennæ small, 10-jointed, the basal joint nearly concealed, the 1st and 2nd stouter than the following ones; the 10th joint dilated to form a club, the apex of which bears a conspicuous band of short pubescence. The parts of the mouth are, as usual in the allies, small and inconspicuous, but the last joint of the maxillary palpi is comparatively large, elongate and subacuminate. The head is constricted behind the eyes, so that these are separated from the thorax. The antennal grooves exist in the same rudimentary condition as in *Cicones*. The anterior coxal cavities are perfectly closed. The metathoracic episterna are very narrow and linear, and have the appearance of a groove close to the epipleura. The posterior coxæ are separated by a triangular projection of the basal ventral segment: first, second and third ventral segments of about similar lengths, fourth a good deal shorter, fifth margined by a deep impression. Legs rather short and slender; tibiæ almost linear, bearing setæ externally; basal three joints of the tarsi quite small, the basal one much concealed, the 4th joint elongate. Scutellum small.

## MYCETOPHAGIDÆ.

## LITARGUS (Munich Cat.).

*Litargus vestitus*, n. sp. Regulariter ovalis, parum convexus, subnitidus, subseriatim parum subtiliter pilosulus, testaceus, capite pronotoque infuscatis, elytris fasciis tribus (prima circa scutellum) irregularibus, plus minusve conjunctis fuscis. Long. 2 mm.; lat. 1 mm.

Antennæ slender, and rather short, yellow, formed much as in *L. bifasciatus*, but more slender, the three apical joints large in proportion to the others, but not transverse. Head very small, with the eyes comparatively larger than in *L. bifasciatus*. Thorax transverse, closely applied to the elytra and perfectly continuing their outline, a good deal narrowed in front, moderately closely punctured, but the punctuation concealed by the rather rough pubescence. Elytra yellowish, but with large, transverse, irregular and variable bands, so disposed as to leave eight yellow marks; they are not closely punctured, and would be shining, except for the rather long pubescence. This is moderately dense, and has somewhat the appearance of being arranged in rows, but with the intervals also pubescent. Under-surface and legs yellow. Front coxæ but little distant.

Sent by Mr. Blackburn as No. 205; found in the crevices of the bark of trees in the mountains of Oahu.

## PROPALTICUS (new name).

*Propalticus oculatus*, n. sp. Brevis, latiusculus, parum convexus, opacus, fere nudus, obsoletissime punctatus, ferrugineus, supra fuscus, elytris maculis duabus (vel quatuor) parum discretis, ferrugineis; antennis tenuibus, clava elongata, laxè articulata, fusca; prothorace basi utrinque prope medium sinuato; elytris striis tribus subtilibus; pedibus tenuibus, tibiis anterioribus elongatis, apice calcari valido armatis, ceteris ecalcaratis. Long.  $1\frac{1}{2}$ —2 mm.; lat.  $\frac{3}{4}$ —1 mm.

This minute insect has more the form of *Soronia* than of anything else I have seen. The antennæ have the two basal joints rather elongate and moderately stout, the intermediate joints are excessively slender and minute, while the three apical ones form an elongate, very slender, and extremely loosely articulated club; the eyes are very

large and rather closely faceted. The thorax is transverse, and emarginate in front, its width is almost that of the elytra, the sides are nearly straight behind the middle, and a good deal narrowed towards the front, the hind angles are rectangular, the base and sides are very finely margined. The scutellum is short and very broad. The elytra have each three fine striae, which, viewed in a certain aspect, have the appearance of very fine elevated lines. The whole of the upper surface is excessively indistinctly punctured, and bears an extremely short, almost invisible, ashy pubescence, which is no doubt very easily abraded.

This insect was sent by Mr. Blackburn as No. 20; it is beaten from trees on the high mountains of Oahu, Maui, and Kauai; its extreme activity in leaping renders it difficult to capture.

The hind legs are not dilated, and I believe the saltatorial power must arise from the front legs, the anterior tibiae of which are rather longer than the others, a little thickened towards the extremity and armed with a peculiar stout spur.

I subjoin the characters, so far as I have been able to add them, of this most anomalous little beetle.

Antennae 11-jointed, with basal two rather long joints, then six very slender, subequal intermediate joints, the terminal three joints forming a very loosely articulated slender club. Eyes large but not very prominent, encroaching greatly on the upper surface of the head. Labrum large, distinct, transverse, rounded in front, leaving exposed the points of the mandibles. Mandibles rather large, with a large basal portion and a moderately slender apical portion; the latter bifid at the extremity. Maxillae with a rather large, pubescent outer lobe, and an extremely slender, linear inner lobe; their palpi stout, 3-jointed, the apical joint not at all dilated, three or four times as long as broad, moderately acuminate, the basal joint rather stouter than the others; the middle joint about as long as broad. Labium not observed. Prosternum large, the coxae placed at its hind part, very widely distant from one another, small but not globose, having an extension in the anterior and outward direction, their cavities not closed behind. Mesosternum broad and transverse, quite on the same plane as the metasternum; middle coxae minute, globose, very widely separated. Hind coxae transverse, very widely separated.

Ventral segments five in number, the basal one in the middle line as long as the two following together, the rest subequal. Legs slender, front tibiæ longer than the others, and with a rather large apical spur; tarsi slender and linear—I think, 4-jointed (possibly 5-jointed); the penultimate joint simple. Elytra covering the hind body, leaving, however, the tip of the pygidium visible.

I am sorry I am unable to see accurately the structure of the tarsi of this minute insect. It is a most difficult one to classify. I have decided that, on the whole, it will be at present least ill-placed in the *Mycetophagidæ*, although it has perhaps more the appearance of the *Nitidulidæ*.

## SCARABÆIDÆ.

### APHODIUS (*Auctorum plurimum*).

*Aphodius pacificus* (n. sp. ex affinitate *Atæni* granulatois, Har.). Nigricans, parum elongatus, opacus, antennis, pedibus, capiteque antèrius sæpius rufescentibus; capite dense punctato, antèrius parum distincte granulato, clypeo late emarginato, utrinque parum distincte subdenticulato; thorace brevi, dense fortiter punctato; elytris subsulcatis, interstitiis subangulatis, antèrius parum, posterius magis elevatis, obsolete granulatis. Long. 3 mm.

This species is of rather short form. The thorax has the hind angles very broadly rounded, the punctuation at its sides is very dense. The sculpture of the elytra is of an indefinite character and very difficult to describe, indeed, it varies considerably in its appearance according to the direction from which it is viewed; there are broad shallow grooves, at the bottom of which are very fine crenate, or punctate striæ; the intervals can scarcely be described as convex, as they have an angulated appearance; along the middle of each interval is a series of very fine and very closely placed granulations, and less definite granulations may be seen along the lateral portions of the intervals. The metasternum is very coarsely punctured; the ventral segments also are coarsely and evenly but not deeply punctured. The basal joint of the posterior tarsus is equal to the length of the longer spur, and is as long as the three following joints together. The colour is variable, being sometimes brownish instead of black, and the legs, antennæ and palpi are sometimes blackish, sometimes red.

This species was sent by Mr. Blackburn as No. 232.



It was represented in the Lafertean collection of Lamellicorns by a specimen labelled "Oxyomus pacificus Reiche, Nov. Zealand;" but I have never seen an individual of it from New Zealand. It is worthy of remark, that all the other *Aphodii* found by Mr. Blackburn are species having a habitat outside of the islands, viz., *Aphodius lividus*, Ol.; *Saprosites pygmaeus*, Har.; *Atænius peregrinator*, Har.; and *Atænius stercorator*, Horn. *Aphodius costulatus*, Fairm. is probably very closely allied to *A. pacificus*; indeed, I at first thought it to be that species, but after carefully considering Fairmaire's description I have thought it more probably that of an allied species. I am equally in doubt as to whether the *Oxyomus dilutus*, Fairmaire, may not be Harold's *Saprosites pygmaeus*; if I understand correctly the French author's meaning as to the comparative lengths of the tibial joints and spurs, the two names do not apply to one species.

## CLOIDÆ.

## Cis (Munich Cat.).

*Cis alienus*, n. sp. Cylindricus, fuscus, subopacus, crebrius subtiliter punctatus, pube flavicante, erecta dense vestita, antennis pedibusque testaceis. Long.  $2\frac{1}{4}$  mm.

The antennæ are small and are pale yellow. The head is small and much immersed in the thorax, its front margin distinctly erect, and a little thickened on each side over the insertion of the antennæ. The thorax is a good deal longer in the middle than at the sides. The punctuation on the thorax and elytra is fine but very distinct and even; the pubescence is rather more conspicuous on the elytra than on the thorax.

This species is remarkably like the European *Cis punctulatus*, but it is smaller; the antennæ are a good deal smaller, the punctuation is closer and finer, and the pubescence much longer.

Two specimens found in the mountain forests of Honolulu, and sent as No. 107.

*Cis pacificus*, n. sp. Oblongus, convexus, haud elongatus, castaneo-testaceus, lævigatus, nitidus; antennis pedibusque testaceis; prothorace sparsim subtilissime punctulato; elytris sparsim sat fortiter sed subobsolete punctatis. Long.  $1\frac{1}{4}$ — $1\frac{3}{4}$  mm.

The front margin of the head is very distinctly raised, and is thickened over the insertion of the antennæ, and in

some individuals this thickened portion is developed into a large angular projection. The species is most remarkably similar to the European *Cis lineato-cribratus*, but the punctuation of the elytra is less distinct and not so regularly arranged, and is, in fact, very nearly the same as in *Cis nitidus*. It is evidently a variable species, the largest individuals being about equal to *C. lineato-cribratus*, while others are not half the size. The punctuation of the elytra, likewise, shows considerable variation.

Found in the mountain forests of Honolulu, and sent as No. 106.

*Cis porcatus*, n. sp. Oblongus, angustulus, parum convexus, nigricans, crebre, fortiter punctatus, brevissime, parceque hispidulus, antennis pedibusque fuscis, illis basi testaceo. Long.  $1\frac{1}{3}$  mm.; lat.  $\frac{1}{2}$  mm.

The antennæ have the first joint of the club a good deal smaller than the following ones. The head has the front margin angularly prominent over the insertion of the antennæ. The thorax is quite as broad as the elytra, the anterior border in the middle is distinctly but not greatly produced over the head, the sides are much deflexed, the basal and lateral margins very fine, the hind angles are very rounded and indistinct, the surface is even, is coarsely, closely and deeply punctured, and not at all shining, it bears excessively short, pale setæ or scales, looking like mere shining, pale points. The elytra are not so dull as the thorax, their punctuation is irregular and rather coarse.

This species may perhaps be best compared with the European *Cis fuscatus*, but it is not half the size of that species, is darker in colour, and the sculpture and surface are more uneven.

Beaten from dry wood in the mountain forests of Oahu and Kauai; Nos. 33 and 212.

*Cis signatus*, n. sp. Oblongus, angustulus, parum convexus, opacus, testaceus, thorace, elytris que nigro-signatis, prosterno medio, pectore abdomine que nigricantibus, densissime subtilissime que punctatus, omnium brevissime hispidulus; antennarum clava fusca. Long.  $1\frac{1}{2}$  mm.; lat.  $\frac{2}{3}$  mm.

This minute species will be easily distinguished by its excessively dense punctuation, and by the markings of the upper surface; these latter consist of a large black irregular mark on the middle of thorax, occupying a large

part of the surface, of a mark on the elytra between the suture and shoulder, of another mark behind the middle, and of an infuscation of the posterior part of the suture; these marks are no doubt very variable in the extent to which they are developed. The very dense, very fine, and very short setæ with which the upper surface is covered may easily be overlooked.

Found on Waianae mountains, Oahu, and sent to me as No. 36. Specimens, which are apparently varieties of the same species, have been found on Halea Kala, Maui Island, and on the mountains of Kauai.

*Cis bicolor*, n. sp. Angustulus, sat convexus et elongatus, nitidus, fere lævigatus, subtus nigro-fuscus, supra variegatus, capite thoraceque nigris, hoc anterius et posterius albido-testaceo, elytris albido-testaceis, lateribus fasciæque mediali ad suturam late interrupta nigris; prothorace sat crebre et fortiter punctato; elytris basi fortiter punctatis, apice impunctatis; pedibus antennisque testaceis, illis femoribus, his clava infuscatis. Long.  $1\frac{1}{2}$  mm.; lat.  $\frac{2}{3}$  mm.

The thorax is rather elongate and narrow, distinctly narrower than the elytra; and the lateral and basal margins are excessively fine and difficult to distinguish. The elytra are slightly narrowed towards the shoulders; the black mark at their outer margin does not extend to the apex. The species is readily distinguished by its shining surface free from setæ, and the pale, almost white elytra, with black marks, as well as by the punctuation of the elytra. The colour is probably variable, as two individuals apparently belonging to the species have the thorax entirely yellow.

Found on the mountains near Honolulu, sent by Mr. Blackburn as No. 34.

*Cis tabidus*, n. sp. Oblongus, angustulus, sat convexus, nitidus fere lævigatus, nigro-fuscus, elytris sordide testaceis, lateribus fasciæque mediali parum discrete nigris; thorace elytrisque parum fortiter et dense punctatis, his ad apicem fere impunctatis, antennæ pedibusque testaceis, illis clava fusca. Long.  $1\frac{2}{3}$  mm.; lat.  $\frac{2}{3}$  mm.

The front margin of the thorax is more or less distinctly pale; the thorax is nearly as broad as the elytra, and is but little longer in the middle than it is at the sides. The

punctuation of the elytra is sparing and indistinct, and though somewhat coarse on the basal portion, becomes entirely obsolete before the apex. The species is closely allied to *C. bicolor*, but is much more obscure in colour, and has the thorax rather shorter and broader, and the elytra rather shorter and more parallel, &c.

Sent as No. 214; found on the mountains of Kauai by beating dry wood.

*Cis diminutivus*, n. sp. Suboblongus, parum convexus, angustulus, rufo-testaceus, elytris, pectore abdomineque fuscis, crebrius parum subtiliter punctatus, crebrius breviter hispidulus, elytris rugulosis. Long. vix  $1\frac{1}{2}$  mm.

The antennæ are short, with rather stout club; the margin of the front of the head is only to be distinguished over the antennæ, and is there excessively fine; the surface is closely and distinctly punctured. The thorax is transverse, slightly broader than the elytra, almost truncate in front, so that the head is not protected, the sides much rounded, and the hind angles greatly rounded; the surface is covered with a dense rather coarse punctuation, and with excessively short setæ. The elytra are nearly black in colour, and so form a great contrast to the head and thorax; they are closely punctured, the punctuation is of an irregular character and has a rugulose appearance; they bear excessively short setæ. The prosternum is infuscate in the middle; the ventral segments are obscurely yellowish towards the extremity.

This minute species will be readily distinguished by its conspicuous punctuation from the following one, which resembles it in size and colour.

Two specimens were found by beating dry wood, near the summit of the highest mountain in the range, near Honolulu.

*Cis læticulus*, n. sp. Suboblongus, parum convexus, angustulus, nitidus, sublævigatus, rufo-testaceus, elytris fuscis; corpore subtus infuscato, capite prothoracisque lateribus læte testaceis. Long.  $1\frac{1}{3}$  mm.

The antennæ are short with rather stout club; the small head is almost without raised margin over the antennæ. The thorax is hardly as broad as the elytra; it is but little produced over the head, it is distinctly narrowed behind, and the hind angles, though depressed

and not easily seen, are not rounded, but somewhat obtusely rectangular; the blackish elytra form a striking contrast in colour to the head and thorax. The whole surface is smooth and shining and nearly free from punctuation.

Found near Honolulu; sent as No. 43.

*Cis evanescens*, n. sp. Suboblongus, parum convexus, nitidus, sublævigatus, nigricans, pedibus fusco-testaceis, antennis basi testaceo, apice fusco. Long.  $1\frac{1}{4}$  mm.

The antennæ are stout, with rather thick short club. The minute head is without raised margin, but has a very distinct transverse impression in front. Although the thorax is but little produced over the head, it is a good deal longer in the middle than at the sides, and the front angles are extremely rounded and indistinct; it is distinctly narrowed behind, and the hind angles, though very obtuse, are not rounded. The surface is almost free from punctuation.

This species seems closely allied to *C. laticulus*, but in addition to its black head and thorax, the more obtuse hinder angles of its thorax characterize it as a distinct species.

Found on the mountains of Oahu and Kauai; sent as Nos. 32 and 213.

### AGLYCYDERIDÆ.

PROTERHINUS (Sharp, Trans. Ent. Soc. Lond. 1878, p. 20).

*Proterhinus nigricans*, n. sp. Latiusculus, nigricans, setis depressis, submaculatim vestitus, setis erectis parum conspicuis; antennarum articulo basali magno; prothorace latiusculo, antèrius parum distincte constricto, lateribus valde rotundatis, dense profundeque punctato, antèrius impresso; elytris brevibus, basi subplanato, versus humeros leviter angustatis (his sat acutis), crebre profundeque punctatis. Long.  $2\frac{1}{2}$ —3 mm.

This species differs from *P. vestitus* in the following points: it is darker in colour, even the legs and antennæ being blackish; it has the eyes larger, the antennæ rather longer and thicker, with larger basal joint, and the punctuation of the surface has a more distinct and definite appearance, owing, perhaps, to the setæ being less deve-

loped. Slight differences in less important points are also to be observed. The anterior impression of the thorax is quite distinct, but the lateral impressions are not easily seen.

Of this species I have also received a pair from Mr. Blackburn, as Nos. 177 and 178; they were found on the mountains of Kauai, by beating dry sticks.

*Proterhinus collaris*, n. sp. Elongatulus, sat convexus, nigricans, setis depressis conspicue maculatim vestitus, setis erectis sat conspicuis; antennis elongatis, articulo basali præsertim elongato; fronte densius squamoso; prothorace elongato, antè impresso, dense fortiter punctato; elytris fortiter punctatis, maculis setarum sericatis, basi emarginatis, sed humeris vix acutis. Long.  $3\frac{1}{4}$  mm.

This is a pretty little species with elongate thorax, and irregularly marked with patches of whitish silky setæ; the upper portion of the head is more than usually densely clothed with yellowish setæ; the antennæ are blackish, elongate and slender. The impression on the front of the thorax is rather distinct, but the lateral ones are scarcely represented. The hind legs are considerably longer than in *P. vestitus*. The tibiæ in the middle and the base of the femora are more or less distinctly rufescent.

I have received a pair as Nos. 175 and 176, and am informed by Mr. Blackburn that the species occurs sparingly in several localities on Kauai, in dry bark.

*Proterhinus humeralis*, n. sp. Angustulus; oculis mediocribus; fusco-rufus, parum distincte variegatus, setis depressis et erectis vestitus; prothorace elongato, evidenter tri-impresso, parum distincte punctato, lateribus rotundatis, antrorsum minus evidenter constricto; elytris basin versus angustatis, humeris acutis antrorsum productis, profunde fortiter punctatis, setis erectis parum conspicuis. Long.  $2\frac{3}{4}$ — $2\frac{7}{8}$  mm.

The antennæ are very obscure red, getting darker towards the extremity, they are rather largely developed, the three terminal joints elongate, and quite distinctly thicker than the preceding ones; the punctures on the elytra are deep but not dense, and those on the basal portion, near the suture, are almost arranged in rows.

This is another of the obscure and difficult species allied to *P. vestitus*; it is narrower than that species, however,

and has the thorax much less constricted in front. In its form it more resembles *P. simplex*, but may be easily distinguished by the impressions of the thorax, and by the humeral angles of the elytra being more produced in front.

The pair of this species sent by Mr. Blackburn were numbered 169 and 170, and were found on Haleakala, Maui.

*Proterhinus pusillus*, n. sp. Minor; oculis parvis; fusco-rufus, setis albidis, depressis, et erectis vestitus, pedibus rufis; prothorace latiusculo, anterie abrupte constricto, basin versus angustato, pone marginem anteriorem parum distincte impresso, obsolete punctato; elytris indistincte punctatis, humeris haud acutis. Long.  $1\frac{3}{4}$ — $1\frac{7}{8}$  mm.

This is the smallest *Proterhinus* yet found; it is most allied to *P. vestitus*, but independently of its much smaller size, it may be distinguished by its smaller eyes, less distinctly impressed thorax, more obscure punctuation, and the less development of the setæ; the scales and setæ with which it is clothed are in the two individuals before me nearly white in colour; the shoulders are a good deal more indistinct and more rounded than they are in *P. vestitus*. The structure of the antennæ is much the same as in *P. vestitus*, and this easily distinguishes the species from the almost equally small *P. debilis*.

A pair of this species, displaying the usual sexual distinction, has been sent by Mr. Blackburn as Nos. 181 and 182; they were found in the forests on the Honohulu range of mountains.

*Proterhinus longulus*, n. sp. Elongatus, angustus, opacus, ferrugineus, elytris vage nigro-signatis, setis depressis sparsim vestitus, setis erectis sat conspicuis; prothorace elongato, parum inæquali, indistincte punctato, linea longitudinali sublævi sat distincta; elytris elongatis sparsim sat fortiter punctatis, humeris acutis, prominulis. Long.  $3$ — $3\frac{3}{4}$  mm.; lat.  $1$ — $1\frac{1}{8}$  mm.

This is a very distinct species, with scanty clothing, which has little tendency to form spots or bands. The eyes are small, the antennæ moderately long, rather slender. The thighs are rather more slender, or less clavate, than in most of the other species, and the ventral

sutures are rather deeper than usual. The dark marks on the elytra are indefinite, and no doubt variable. The species seems to be closer to *P. simplex* than to any of the others.

A pair of this species was sent as No. 164. Mr. Blackburn says it is found in a large fern growing on the Honolulu range of mountains.

*Proterhinus basalis*, n. sp. Latiusculus, parum convexus, nigricans, setis depressis sat dense irregulariter vestitus, setis erectis sat conspicuis, antennis tibiisque rufo-obscuris; prothorace latiusculo, anterieus breviter constricto, basi fortiter angustato, fortiter sed parum discrete punctato, subhispido, tri-impresso; elytris breviusculis, ad basin transversim depressis, humeris acutis. Long. 3 mm.

About the size of the largest *P. vestitus*, and somewhat similar thereto, but broader, and readily distinguished from it, and the other allies, by the depressed basal portion of the elytra. The scutellum is more than usually inconspicuous. The antennæ are rather long, and slender. The prosternum, in front of the coxæ, is somewhat flattened or depressed in the middle, and the undersurface is not so rugose as in the allies; the large basal ventral segment being remarkably free from punctuation.

Three individuals were beaten from dry sticks, at an elevation of 2,000 feet, on the island of Kauai; the one sent me is of the rostrate sex, and was No. 166.

*Proterhinus sternalis*, n. sp. Robustus, breviusculus, nigricans, antennis, femoribus basi, tibiis tarsisque rufis, setis depressis, densius irregulariter vestitus, setis erectis sat conspicuis; prothorace latiusculo, anterieus constricto, rugoso-punctato, tri-impresso; elytris basi fortiter emarginato, parum discrete punctatis, basi summo utrinque prope scutellum subtuberculato, sutura subtilissime carinato-elevato, humeris prominulis; prosterno anterieus in medio concavo; tibiis extus longius setosis. Long.  $2\frac{1}{2}$ — $3\frac{1}{4}$  mm.

This is a very distinct species, though at first sight it seems similar enough to *P. vestitus*. The eyes are largely developed. The tubercle on each side at the base of the elytra is tomentose like the rest of the surface, and therefore not very conspicuous; there is also a very obscure oblique elevation proceeding from each shoulder



towards the suture: there is an indistinct darker patch on the side of each wing case about the middle, and on this the punctuation appears coarser than elsewhere.

Found on dead wood in the forests at an elevation of 4,000 ft. on Haleakala, Maui. The pair sent represent the sexes; the unrostrate individual is smaller than the other, with the anterior legs rather shorter, and the lobes of the 2nd tarsal joint on the front feet unusually developed. Sent as Nos. 167 and 168.

*Proterhinus Lecontei*, n. sp. Major; parum dense griseo-squamosus; prothorace inæquali; clytris basi emarginato, et quasi quadridentato, pone medium valde tuberculato elevatis, setis erectis sat conspicuis. Long. 4—4 $\frac{3}{4}$  mm.

The antennæ are largely developed, and are about intermediate between red and black in colour. The eyes are large. The thorax is constricted in front, and bears three very large impressions, the anterior one being excessively large, the sides and front margin are marked by some curved erect setæ. The elytra are emarginate at the base, with the humeral angles excessively prominent, and there is a prominent tubercle on each side of the scutellum projecting somewhat forwards as well as upwards; along the middle of each wing case is a longitudinal elevation, terminating some distance before the extremity very abruptly, and so forming a very prominent tubercle; the punctures are distant but distinct, and rather evenly distributed.

Beaten from dead wood in the forests at an elevation of about 4,000 ft. on Haleakala, Maui. No. 165.

*Obs.*—This is by far the largest species of the genus yet found, and is the most highly developed and most sexually differentiated, and at the same time seems to make the nearest approach to *Aglycydes*; it may, perhaps, have to be treated as a distinct genus. The epipleuræ of the elytra are less rudimentary than in the allies, and the coxæ are not so widely separated, especially in the sex without rostrum. In the other sex the beak is highly developed. *P. sternalis* shows an approximation to *Lecontei*, however, and if one or two intermediate species are discovered, as is quite possible, *P. Lecontei* will have to remain united in a first synthesis, with its

more insignificant-looking allies. I have named this remarkable little beetle in honour of the distinguished entomologist of Philadelphia, who has so indefatigably and successfully added to our knowledge of the *Coleoptera*.

*Proterhinus paradoxus*, n. sp. Oculis minutis; parum elongatus, ferrugineus, subnitidus, sine setis depressis, setis erectis elytrorum sparsis, sed conspicuis; prothorace inæquali, antèrîus conspicue constricto, obsolete punctato, sparsim hispidulo; elytris planatis, lateribus rectangulariter deflexis, omnium fortiter, dense punctatis, humeris depressis, inconspicuis; femoribus parum clavatis. Long.  $2\frac{1}{4}$  mm.

The antennæ are rather slender, but have the 2nd joint thicker than usual; the thorax is rather small, the three impressions are very large, the anterior one is particularly indefinite, and cannot be said to be limited laterally, and it is to this that is due the greater apparent constriction of the front part of the thorax; the punctuation is very indistinct, and the surface is rendered hispid by curled suberect setæ. The elytra have the whole of the dorsal portion quite flat, there is an appearance of an obsolete tubercular elevation at the base on each side near the scutellum, the lateral portions of the wing cases are placed quite at right angles to the disc; the punctuation is very deep and coarse and close.

Two individuals have been found in the mountain forests near Honolulu; sent as No. 163.

*Obs.*—This species is so very distinct that, if connecting links are not found, it will have to be treated as a distinct genus. The minute eyes indicate an inactive life. The very different sculpture and clothing, and the peculiar form of the wing cases, are accompanied by a diminution of the 2nd joint of the tarsi and a remarkable development of the sutures of the ventral segments, which are very coarse and deep. The individual described is probably the unrostrate sex, but, if so, it has the head narrower and more rostrate than in the unrostrate sex of other species, and I shall not be surprised if it prove that in this species the sexual differentiation of the head is less than in the other *Proterhini*.

## SCOLYTIDÆ.

## HYPOTHENEMUS (Leconte).

I have described one of Mr. Blackburn's new species under the above generic name with some hesitation, for at present it appears there are no systematic characters to distinguish the genus from *Cryphalus*. Hitherto the number of joints in the funiculus of the antennæ have been used for the purpose, but this has been abandoned by Leconte, who now includes under the name some species having two, and some having more than two intermediate joints in the antennæ. The reason he has given (Proc. Am. Phil. Soc. 1876, No. 96, p. 355) makes me think he is correct in this procedure. I have not, however, called the new species here described a *Cryphalus*, because I think it quite probable that future investigations will reveal a sufficient gap between *Cryphalus* (as represented by *binodulus*, Ratz., and its allies) and *Hypothenemus eruditus*, Westw., with the species near it, to justify their separation.

*Hypothenemus maculicollis*, n. sp. Breviusculus, latiusculus, subcylindricus, niger, antennis pedibusque fusco-testaceis, setulis omnium brevissimis, fuscis vestitus; prothorace antrorsum fortiter asperato, posterius subtilissime granulato, sub-opaco, medio parum distincte rufomaculato; clytris subtiliter seriatim punctatis, posterius vix retusis. Long.  $1\frac{3}{4}$  mm.

This species is intermediate in size between *H. eruditus* and *Cryphalus binodulus*; the setæ of the surface seem to be finer than in *H. eruditus*, and are very easily removed; they are very dense on the deflexed apical portion of the clytra, and cause the surface there to appear extremely opaque. The intermediate joints of the antennæ are excessively abbreviated, so that at first sight the globular 2nd joint appears contiguous with the base of the club; but examination with a compound microscope reveals some very short, broad, indistinctly separated intermediate joints, which are, I believe, three in number: this is the same structure as is stated by Leconte to occur in the North American *H. dissimilis*.

I have received three individuals as No. 39 from Mr. Blackburn, with the remark "widely distributed."

Besides the *H. maculicollis*, Mr. Blackburn has also found the *H. eruditus*, Westw.; and as regards this little mite, I may remark that I think it is probably nearly cosmopolitan, and it may be expected to have been described under various names. I do not consider, however, that it can be the species intended by Fabricius, under the name of *Bostrichus ruficollis* (Syst. El. ii. p. 388), as Ferrari has suggested (Berl. Zeit. 1868, p. 255). The little atom can probably live on a great variety of food, and will pretty certainly be found to vary a good deal in minor particulars. *Cryphalus aspericollis*, Woll., from the Canary Islands and Ascension Island, seems to me the same species; and also *Hypothenemus hispidulus*, Leconte; and it is also quite probable that *Stephanoderes seriatus*, Eich., is, as suggested by Leconte, the same thing.

Mr. Blackburn finds the insect in the bark of a species of acacia on the plains of Oahu.

#### CERAMBYCIDÆ.

CLYTARLUS (Sharp, Trans. Ent. Soc. Lond. 1878, p. 208). 6

Mr. Blackburn has now discovered two other species of this remarkable genus of Longicorns; the two are striking from the great difference that exists between them. Their divergence from the two species previously described is in opposite directions, and is so great that if these insects are treated in the same manner as the rest of the *Clytides* have been by modern authorities, they will have to be considered as two genera, distinct from *Clytarlus*. In *C. microgaster* the femora are much incrassate, the incrassation being nearly gradual from near the base to the apex, with a tendency to an apical knob in addition. The little *C. modestus*, on the other hand, has the basal half of the femora very slender, while the outer half is abruptly incrassate. Besides this the hind body is reduced to a mere appendage in *C. microgaster* (in the male at least, for that is the only sex I have seen), while it is well developed in *C. modestus*. I find, however, that the two original species, *C. robustus* and *C. cristatus*, by no means agree in the form of the femora; and the development of the hind body, as I have described in *C. robustus*, is liable to great difference in the sexes of one species. As there are no doubt other allied species to be discovered in the

Hawaiian Archipelago, I think it advisable, under the circumstances above mentioned, to leave the question of generic diversity till more is known of the actually existing species.

*Clytarlus microgaster*, n. sp. Niger, antennis pedibusque (his ex parte) rufis; fronte, thoraceque sulphureo-bivittatis; elytris fusco-rufis, maculis setarum pallidarum numerosis; pectore ad latera antierius et posterius sulphureo-maculato; pedibus quatuor posterioribus, valde elongatis, ad apicem nigris, tibiis tarsisque posterioribus hirsutis. Long. 17 mm.; lat. ad elytrorum basin vix 4 mm.

Antennæ of male reaching just to extremity of elytra, entirely pale red; head black, with two approximate bands of yellow setæ on the front, on the vertex with scattered yellow setæ. Thorax longitudinally elevated along the middle, the elevation not reaching quite to the base, and with its anterior and posterior parts a little the most elevated, the posterior portion of the elevation is traversed by a very fine transverse carina, and the anterior portion is obscurely granulated. The thorax is black, but is traversed by two broad and excessively conspicuous bands of yellow setæ; the space between these bands is very densely punctured and dull, while outside these bands the surface is glabrous and shining. The elytra are very attenuate at the extremity, the base and sides are reddish, but this colour shades gradually into pitchy black; the surface is closely punctured (the punctuation becoming obsolete at the apex), and is marked by numerous irregular flecks of depressed pale-yellow setæ, which are so irregularly disposed that they are not quite similar on the two wing cases. The undersurface is black, clothed scantily with whitish setæ or hairs, and marked between the edge of the wing case and the middle with a dense patch of sulphur-yellow setæ, and with a similar patch at the apex of the side piece of the metasternum. The hind body (in the male) is very minute and much arched, the basal segments are pitchy, the apical ones reddish. The front legs are pale red, with the femora blackish towards the apex, and bear pale hairs. The middle and hind legs are greatly elongated (especially the hinder ones), and the femora are very peculiar, the base is rather slender,

and at a little distance from it they are slightly bent, and get gradually thicker, while at apex there is again a slight additional incrassation, which is very well marked on the hinder pair, though not on the middle ones; this apical portion is intensely black in colour, so as to form a remarkable contrast to the dull-red colour of the basal portion; the femora are somewhat scabrous, and bear rather scanty pale hairs or setæ, the black apical portion bearing a denser black pubescence; the middle tibiæ and tarsi are red, with but slight variegation in their colour or in that of the scanty hairs they bear. The hind tibiæ are elongate (just about the length of the wing cases), they are laterally compressed, and the basal portion is a little slenderer than the rest; they are clothed with rough, erect, dense hairs, which are but little developed on the basal portion, and are there yellowish, while on the lower part they become black, and are more largely developed; the hind tarsi also are hirsute, but the hairs are of a pale ochreous colour, and so form a striking contrast to the tibiæ.

This species was discovered by Mr. Blackburn on one of the higher mountains of the Honolulu range. Four visits to the spot of its discovery have been rewarded by the capture of three individuals; one of these is a female, and Mr. Blackburn informs me that it has the antennæ a good deal shorter than the male, and a little thicker near the apex, the elevation of the thorax flat, instead of saddle-shaped, and the hind tibiæ rather more straight. Whether its hind body is reduced in size in a manner comparable to that of the male I do not know.

*Clytarlus modestus*, n. sp. Minor; gracilis, rufo-testaceus, antennis, elytris, pedibusque pallidioribus, fere nudus, parum nitidus; prothorace dense obsolete punctato, opaco, medio longitudinaliter parum elevato, carinulis valde abbreviatis, transversis, tribus, anteriore magis elevato; elytris versus apicem leviter attenuatis, fortiter, dense punctatis; abdomine nigricante, apice rufescente; corpore subtus, sparsim albido-setoso; pedibus elongatis, gracilibus, femoribus quatuor posterioribus, dimidio apicali abrupte incrassato. Long. 5 mm.; lat. 1 mm.

The thorax is but little longer than broad, it is subcylindric, and has but little basal constriction; in the

middle, in front, there is a small elevation, the summit of which bears a fine carina, and behind the middle there are two somewhat similar but less elevated carinae.

Two specimens of this fragile little Longicorn were found by Mr. Blackburn at a great elevation on Haleakala, Maui. They were apparently both of the same sex, and I am doubtful whether it will prove the male or the female. The antennae scarcely extend so far back as the half length of the wing cases, and joints 6—11 are much abbreviated in comparison with the three preceding ones. The hind body is well developed, reaching nearly to the apex of the elytra. I suspect, however, that this is the male.





VI. *On some new or little known British Hymenoptera.*  
By P. CAMERON.

[Read March 5th, 1879.]

TENTHREDINIDÆ.

HYLOTOMA STEPHENSI, Leach.

I HAVE lately (thanks to Mr. J. E. Fletcher, of Worcester) had an opportunity of examining some specimens of both sexes of the *Hylotoma Stephensi*, Leach, a form which appears to be very little known.

Stephens (Ill. vii. 19, 14) describes it thus:—Head and thorax glossy violet-black; abdomen yellow; legs black, with whitish pile, and the four hinder femora pale yellow; wings hyaline fuscous, anterior with the costa to the stigma, including this last, dusky. Male with the antennæ rather long; female with the pleuræ yellow.

I may supplement this description by adding that the pleuræ in the ♂ are also sometimes yellow, and that the sutures of the mesonotum and the posterior tibiæ and tarsi are occasionally, for the greater part, of the same colour; while, on the other hand, there may be scarcely a trace of this colour on the pleuræ in the darker-coloured specimens. The labrum and the two front legs may be tinged with yellow, and the antennæ may be fuscous or light brown.

Mr. F. Smith, in his "Nomenclature of British Hymenoptera," sinks *Stephensi* as a variety of *pagana*, Pz., which differs from it in having the thorax and legs uniformly bluish-black, and the wings (comparing the specimens in my collection with *Stephensi*) are much darker, and the labrum is black. Mr. Smith may be correct in this, yet, if *Stephensi* may not be a good species, it still must be regarded as a distinct variety; a variety, too, confined exclusively to Britain, for no continental author has described *pagana* as varying in coloration.\*

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\* Eversman (Bull. Mosc. xx. 11) describes a ♂ of *pagana* having all the tibiæ and tarsi luteous; Zaddach suggests that this is very possibly a form of *H. fuscipennis*, H.-S. or, if not, a distinct species.

Brischke and Zaddach,\* in their monograph of the European *Hylotomæ*, appear to regard it as a good species, but one of which they had seen no examples.

Against the view that *Stephensi* may be a distinct species from *Pagana* must be stated the fact that the yellow on the thorax and legs is not constant in position or quantity; so that in the absence of a greater number of specimens to judge from, and of any information about its habits, its specific distinctness must be considered doubtful. But if not a species, I should certainly consider it as a variety or race rather than an aberration.

*Pagana* is one of the most widely distributed of sawflies. It is found all over the Palearctic, also in the Oriental region, while in the Nearctic it occurs as far south as Georgia.

Mr. Smith (Trans. Ent. Soc. 1874, p. 375) describes a species (*H. similis* sibi) from Japan, which, according to him, differs only from *Pagana* in having a yellow spot beneath the wings. If *Similis* is to be considered a good species, then *Stephensi* may well be regarded the same, if it be not identical with *Similis*.

The luteous British species of *Hylotoma* may be distinguished as follows:—

- A. Legs and thorax entirely bluish-black .. .. *Pagana*, Pz.
- B. Legs more or less luteous.
  - a. Pleuræ marked with yellow.
    - Legs for the greater part bluish-black; hinder tarsi not annulated with black .. .. *Stephensi*, Leach.
    - Legs for the greater part yellow; hinder tarsi annulated with black .. .. *Rosæ*, L.
  - b. Pleuræ without yellow.
    - Femora only black at the apex; anterior wings with a fascia below the stigma.. *Cyaneo-crocea*, Forst.
    - Femora quite black, wings without a fascia *Melanochra*, Gmel.

#### NEMATUS NIGRO-LINEATUS, Cam.

Two or three years ago I collected a lot of the leaf-rolling larvæ of *Nematus crassulus*, Dbm., and placed them in a bottle by themselves. In the following spring the imagoes of *Crassulus* duly appeared, and along with them another and very different species, whose appearance in the bottle I could not account for, as I had been very

\* Schr. Ges. König. 1862, 108.

careful to put in only the *Crassulus* larvæ. The strange insect had such a great resemblance to the common gall-maker (*Nematus pedunculi*, or whatever its name may be\*), which forms the hairy pea-shaped galls on *Salix aurita*, that I thought it was a stray specimen which had got in with the other larvæ by mistake, but still I could not identify it as the gall-making species to my satisfaction, and so I left the matter to be cleared up by renewed investigation.

The enigma has now been cleared up by that acute investigator of the habit of insects, Mr. J. E. Fletcher, who succeeded last year in rearing four specimens out of larvæ living in the rolled-down leaves of *Salix viminalis*, so that I must have mixed up the larvæ of *Nigro-lineatus* with those of the commoner species.

Apart from the above-mentioned specimen, I have been acquainted with *Nigro-lineatus* since June, 1876, when I captured it among osiers on the banks of the Severn above Gloucester. I never could identify them with any of the descriptions. I sent a specimen over to Professor Zaddach, who returned it as being unknown to him. Still I did not venture to describe it, but inserted it in my "Catalogue of British Tenthredinidæ," under the name of *Nigro-lineatus*. Now, however, that its habits are known, it may be described without any hesitation.

Leaving the total diversity of habits aside, the gall-making *N. pedunculi* (the species having the greatest resemblance with it), may be known from *Nigro-lineatus* by the absence of any white on the pronotum apart from the tegulæ, by the somewhat longer and thicker antennæ, those of the ♂ being especially thicker, the 3rd joint, too, being nearly as long as the 4th; the mesonotum is more shining and not so punctured, while the 3rd submarginal cellule is longer, and the 2nd recurrent nervure interstitiate or nearly so.

Then it differs widely from all the leaf-rolling species known. *N. leucostictus*, Htg., and *N. crassulus*, Dbm., having the stigma and legs almost unicolorous, besides differing widely in form, while *N. xanthogaster*, Foers., as the name denotes, has the body marked with yellow, while the stigma is yellow and the sentellum punctured.

Neither Mr. Fletcher nor myself knows anything about the larva beyond its leaf-rolling habits, but I hope to be

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\* See Fauna of Scotland, Hymen. i. p. 43.

able to discriminate it this summer. The following is a description of the imago.

Black, almost shining. Antennæ about a fourth shorter than the body, black, filiform, the 3rd and 4th joints about equal, the rest becoming gradually shorter, and more distinctly separated and truncated at the apex. Head black, labrum and clypeus white, pilose, clypeus incised, mandibles piceous at the tips; palpi fuscous; vertex finely punctured, and covered with depressed pile. Mesonotum semi-opaque, finely punctured (more distinctly than on the vertex), scutellum shining, almost impunctate; cenchri obscure; pleuræ smooth, shining; the edge of the pronotum and the tegulæ white. Abdomen a little longer than the head and thorax, the apex bluntly pointed; cerci very long, pointing outwardly; sheath of saw projecting a little beyond the end of the cerci, pilose. Legs white; the extreme base of coxæ, the femora except at the base and apex, the apex of the posterior tibiæ and the tarsi black; the extreme apex of the anterior tibiæ and the apex of the tarsi fuscous; calcaria short, wings hyaline, costa fuscous, stigma large, fuscous at base, white at the apex; the 3rd submarginal cellule is longer than broad; the 2nd recurrent nervure is received a good bit in front of the 2nd submarginal.

The ♂ is similar in coloration, the antennæ are a little longer, but not much thicker; the underside fuscous, and the 3rd joint shorter than the 4th, the stigma fuscous.

Length 2—2½ lines; alar. exp. 4½—5 lines.

## CYNIPIDÆ.

### ONYCHIA.

This genus was first mentioned by Westwood, in Loud. Mag. 1833, p. 494, then by Walker, in Ent. Mag. ii. 517, the *Evania edlogaster*, Rossi, being given by the latter as the type, but his description does not agree with that insect, nor has it ever been found in this country so far as I can learn. The next mention of the genus is by Westwood, in the Appendix to his Introduction, vol. ii. p. 56, where it is characterized as follows:—

“Abdomen with the third segment very large, concealing the posterior ones, petiole very short, scutellum channelled throughout; antennæ filiform, 14-jointed in ♂, 13 in ♀; cubital areolets three; subcostal nerve not continued beyond the rib.”

An undescribed species indicated (*l. c.*), under the name of *biusta*, is given as the type, no mention being made of *ediogaster*.

By Dahlbom (*Onychia* och *Callaspidia*, 1842, p. 5), *Onychia* was used generically for the reception of *Evania ediogaster* and two other species, while another genus, *Callaspidia*, was created for the reception of the *Figites notata*, Fonsc. Giraud (*Verh. z. b. ges. Wien*, 1860, p. 156) followed Dahlbom in his definition of the genera, while he formed also another genus, *Omalaspis*, for his *O. noricus*. Reinhard (*B. E. Z.* 1860, p. 238) reversed this, using *Onychia* for *notata*, &c., while the name of *Aspicera*, Dbm., was used for *ediogaster*, Giraud (*l. c.*) himself having suggested either this, or the sinking of *Aspicera*, and the using of his own name *Bellona*, in preference. All this confusion was caused by *ediogaster* having been given as the type in the earlier indications of the genus; nor is it certain that the manner in which the names are used by Reinhard (and he is followed by Thomson and Foerster) can be considered correct. For it is clear that the description given by Westwood cannot apply to the species of *Onychia* as restricted by these authors. According to the Rev. T. A. Marshall (*Ent. Ann.* 1874, p. 120), *Onychia biusta* is an *Omalaspis*, a fact rendered clear from the description, as well as from an examination of the insect. *Onychia* then should be retained for *noricus*, Gir., *niger*, Htg. and *biusta*, W., while the *Onychia*, Reinh., Thoms., would require to be renamed.

However, I do not see that much good would be done by now acting in this way, the more especially as *Onychia* has been employed for so many years in its present meaning. Obviously, too, when a monographer splits up a genus into several, he has the right to use his own discretion as to for what species he will retain the original name, and what for the new genera. Moreover, we have seen that in the first indication of the genus a type was given with which the generic description did not agree, while the last type was not and still remains undescribed.

The three genera may be briefly characterized as follows:—

- |  |                    |
|--|--------------------|
| A. Scutellum ending in a sharp spine .. .. | <i>Aspicera</i> .  |
| B. Scutellum truncated.                    |                    |
| Abdominal petiole short .. ..              | <i>Omalaspis</i> . |
| Abdominal petiole long .. ..               | <i>Onychia</i> .   |

*Omalaspis*, as we have seen, is British, being represented by *biusta*. I have examined the specimen mentioned by Mr. Marshall (*l. c.*), but it unfortunately is not in good condition. It is black; the six basal joints of the antennæ and the legs are bright red; the basal three-fourths of the abdomen at the sides, and the basal half at the sides and above, dull red. The tegulæ appear to be dull red. The thorax is opaque, the mesonotum is faintly punctured. Length a little over 1 line.

*Om. niger*, Htg., differs from it in having the whole of the antennæ red, and the coxæ and base of femora black, while there is no red on the abdomen. *Om. noricus*, Gir., has the first joint of the antennæ black and the rest red; the abdomen is entirely black, as are also the tegulæ; the antennæ are stated to be as long as the head and thorax, while in *biusta* they are longer, being as long as the head, thorax and half of abdomen.

*Biusta* appears to be covered with a faint pale pubescence on the thorax, it being especially long on the metathorax.

I am glad to be able to record *Onychia*, Reinh. (*Calaspidia*, Dbm., Gir.), as British, and what adds to the interest of the discovery is that our species appears to be undescribed. I would propose to call it—

*Onychia nigripes*, sp. n.

Antennæ as long as the body, filiform, the apical joints a very little thicker than the basal; the 1st joint is nearly double the length of the 2nd; the 3rd is the longest, being a little longer than the 4th, which is itself somewhat longer than the 5th; the rest become shorter and thicker to the last, and also more globular and more truncated at the apex; the 13th joint is longer than the preceding two, being nearly as long as the 3rd; the colour is black for the greater part, the basal half of the joints of the flagellum being pale testaceous, this colour being especially noticeable on the apical joints. Head black, roughly punctured. Thorax black, opaque, roughly punctured; the prothorax is marked with longitudinal striations. The mesonotum is deeply fringed with long white hairs. Abdomen black, smooth, shining; the little ring on the petiole is piceous. Legs black; the anterior knees, base of all the tibiæ and tarsi testaceous. Wings hyaline, tinged with testaceous near the nervures.

The furrows of the mesonotum agree with Dahlbom's figure of *O. fonscolombei*, while it has also the peculiar hyaline membrane in front of the scutellum and the furrowed hind tibiæ characteristic of the genus.

Length 2 lines; alar. exp.  $3\frac{3}{4}$  lines.

All the European species of this genus have the scutellum and more or less of the thorax, with the legs, reddish. It is true that the amount of the red coloration on these parts varies, but so far as I can make out from the descriptions, the thorax and the legs are never black together, nor is the red ever entirely absent, although it may vary from sanguineous to brown.

If Dahlbom's figure (pl. 1, f. 8) of *Onychia fonscolombei* be correct, then there is a considerable difference in shape between it and our insect. In *fonscolombei* the metathorax is longer and not so high, whereas in *nigripes* it is straighter. The last joint of the antennæ in *fonscolombei* is represented as being not much longer than the preceding, but this of course may be a mistake on the part of the artist.

*Onychia rugosus*, Htg. (considered by Reinhard to be a variety of *O. Westwoodi*, Dbm.), has the thorax all black, but then the legs are red.

The only specimen of *nigripes* I have seen was taken by Mr. J. B. Bridgman at Norwich. It is a female.

#### ALLOTRIA.

##### *Allotria pleuralis*, sp. n.

Antennæ a little shorter than the body, the apical half somewhat thicker than the basal; the first four or five joints pale yellow, the others black or rather dark fuscous. Head pale red, the vertex very slightly darker. Thorax: pronotum, mesonotum and the base of metanotum black; the pleuræ, sternum and apex of metanotum dark red. Abdomen black, reddish at the base above, and the basal half of the sides is more or less dark fuscous red. Legs pale yellow. Wings clear hyaline, nervures very pale testaceous; radial cellule small, scarcely longer than broad.

Length a little over  $\frac{1}{2}$  a line; alar. exp.  $1\frac{1}{2}$  lines.

This little species comes near to *A. longipennis*, Htg., but that has the whole of the antennæ and only the pro-

and meso-thorax reddish. *A. posticus*, Htg., differs from it in having only the metathorax red. *A. castaneus* is distinguished from it by having the body almost entirely castaneous; it is a larger species; the antennæ are longer, and the radial cellule is larger and longer.

My five specimens (three from the Clyde, near Newton, and two from Possil Marsh, all taken in July) show slight variations in the amount of red on the thorax and abdomen.

*Allotria Tscheki*, Giraud.

Vehr. z. b. Ges. Wien. 1860, 128, 4.

I have several specimens of what I consider to be this species, taken in Clydesdale—in Mugdock Wood and at Loch Libo—on the banks of the Ken, above Dalry—and one near Gloucester. It was bred by Tschek, from an *Aphis*, living on *Ribes rubrum*. It agrees so very closely with *Allotria victrix*, Westw., that at first I placed my specimens along with that species; and Giraud himself says that *Tscheki* might be taken for a variety of *victrix*, but that it differs from it in being smaller, in having the vertex always black, and in having the radial cellule shorter.

PHÆNOGLYPHIS.

Foerster. Verh. z. b. Ges. Wien. 1869, p. 338.

This genus is distinguished from the other genera of *Allotrina* by having the mesonotum distinctly furrowed, and one or two depressions at the base of the scutellum. *Hemicrisis*, Foer. (*l. c.*), agrees with it in the former peculiarity, but differs from it in having no depressions at the base of the scutellum.

The type of the genus is *Phæn. xanthochroa*, Foer. (*l. c.*, p. 339), which was taken near Lüttich.

C. G. Thomson has recently (*Opusc. Ent.* 1877, p. 811) characterized the same genus (or subgenus, as he calls it) under the name of *Auloxysta*, and describes seven species from Sweden—one of them (*A. rufa*) being to all appearances identical with Foerster's *Xanthochroa*.

In the collection of the Rev. T. A. Marshall there is a specimen of a *Phænoglyphis*, unfortunately not in very good condition; it is a ♂, and agrees very closely with the description of *Xanthochroa*, except in so far that it has the



apical third or so of the abdomen fuscous, while, according to Foerster and Thomson, the entire body is reddish-testaceous. The identity of the British specimen is thus a little doubtful; but as neither Thomson nor Foerster describes the ♂ of their species, it would be somewhat hazardous to consider ours as distinct. All the other species described by Thomson have the bodies black.

PSICHAERA, Foerster, *l. c.*, p. 356.

*Psichacra Dalei*, sp. n.

Antennæ a little longer than the body, red, the four apical joints fuscous, the 1st nearly double the length of the 2nd, thickened and semi-truncated at the apex, the 2nd globular, the 3rd a little longer than the 4th, thin, slightly thickened and truncated, and of a fuscous colour at the apex; the three following joints a very little shorter and of the same form and colour; the next three are a little shorter, thicker, and rounded at the apex; the last four are thicker than the preceding, the last being thicker and longer than the 12th; but there is scarcely a well-marked club. Head smooth, shining. Thorax smooth, shining, covered with a scattered pile; dull red, the mesonotum obscured with black in the middle; the pleuræ and sternum for the greater part black. Cup of scutellum raised, with a projecting rim, the posterior end projecting over the top like a ridge; at the base of the scutellum are two deep depressions.

Abdomen shorter than the thorax, compressed, acute, thin, black; the belly testaceous. On the second segment is a long hair fringe. Legs red. Wings hyaline, nervures pale testaceous.

Length  $1\frac{1}{4}$  lines; alar. exp.  $3\frac{1}{4}$  lines.

I am not quite sure as to the generic position of this insect of which I have only seen the female, but as a whole it comes very near to *Psichacra*, as defined by Foerster, and more particularly in the antennæ not ending in a distinct club, and in the form of the scutellum. The type of *Psichacra* is *longicornis*, Htg., of which I have only seen the ♂. Foerster (*l. c.*, p. 356), makes mention of the female, but gives no particular account of the antennæ in that sex beyond that there is no distinct club. Thomson (Oef. 1861, 404, 12), quotes *Eucoela gracilis*, Dbn., as probably the female of *longicornis*, Htg. He

describes the antennal club in the female as "haud discreta," which agrees tolerably well with Foerster's description. *Gracilis* agrees very closely with *Dalei* in coloration, it having the "scutello, foveo lanceolata metathorace, pedibusque rufo-testaceis."

*Gracilis* is in the collection of the Rev. T. A. Marshall, and is, I believe, correctly named by that gentleman, although the scutellum is black in his specimen. The antennæ are, however, very different from those of *Dalei*, the 3rd and following joints being short, thicker and more globular; the antennæ, too, being shorter than the body, which is much larger, stouter, and not so much compressed as in the other. The alar neuration is the same in the two species.\*

Whether *longicornis* be the ♂ of *gracilis* or not is a point which I cannot at present determine from the limited material at hand, but I am inclined to believe that the two are quite distinct.

*P. Dalei* was taken by Mr. J. C. Dale at Glanville's Wooton, Dorsetshire.

*Obs.*—Many of Foerster's genera in this group of *Cynipidæ* are not easily made out, especially with the males (with one or two exceptions, when the males are easier identified than the females), and many of the characters he relies upon for the formation of his genera—especially those drawn from the form of the antennæ—appear to me to be merely sexual, and not of generic value. The antennæ in the males are very similar in the *Eucoelides*, while there is great variation with these organs in the females.

#### HEXACOLA, Foerster, *l. c.*, p. 347.

I have taken a specimen of *Hexacola hexatoma*, Htg., at Bonar Bridge, Sutherlandshire, and another in a moist meadow along the banks of the Allander, near Glasgow. From this it would appear to be a widely-distributed species.

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\* Mr. Marshall, in his list of *Cynipidæ* in the Ent. Ann. for 1874, refers *gracilis* to the genus *Cothonaspis*, which, however, is not the case, that genus, *inter alia*, not having a hair fringe. Mr. Marshall probably had mentally confounded *gracilis*, Dbm., with *gracilis*, Htg., which is a true *Cothonaspis*.

I presume that Thomson's *Kleditoma hexatoma*\* is the same as Hartig's species of the same name, although Thomson does not make any mention of it; at least there does not appear to be any great difference between the descriptions of the two authors.

Giraud † describes another species with a 6-jointed club, which is probably the same, the only difference being that it has more red colour on the legs.

#### CHARIPS MICROCERA.

Under the above name, there is in the collection of the Rev. T. A. Marshall (who has very kindly lent me all his parasitic *Cynipidæ* for examination) a little species which had belonged to the late A. H. Haliday, by whom it had been named; but seemingly has never been described by anyone.

The specimen is old and not in very good condition, so that it would not be very easy to draw up a proper description from this solitary specimen. Fortunately, however, I this summer succeeded in capturing eight specimens in the south of Scotland, thus giving ample material for determining its systematic position. My specimens were taken on the banks of the Ken above Dalry, at Colvend on the Kirkeudbright coast, and one example near Dumfries. Curiously enough all I have taken are males, that being likewise the case with Haliday's specimen.

In Foerster's generic arrangement it comes into his family "*Figitoideæ*," and in the table given (*l. c.*) at pp. 363, 364, would belong to ‡ d. d. k, and comes therefore nearest to *Sarothrus*, from which it differs in the perfectly smooth, shining, unfurrowed thorax. *Dicæra*, the next genus to *Sarothrus*, may be known by the absence of a hair fringe on the second abdominal segment, *Charips* having one, while, on the other hand, *Dicæra* has two holes at the base of the scutellum.

Antennæ as long as the body, 14-jointed, the 3rd joint curved, longer than the 4th. Eyes bare; mesonotum and scutellum smooth, shining, glabrous; the former without any furrows, the latter without any depressions at the base; somewhat oval in shape, and, compared to the

\* Oef. 1861, 388, 5.

† Verh. z. b. Ges. Wien. 1860, 143, 25.

size of the thorax, comparatively large. Abdomen with a slight hair fringe on the base of the second segment. Wings with the radial cellule small, a very little longer than broad; the margin of the wings with a long hair fringe. In the general form of the antennæ (except, perhaps, that the joints are broader and more rounded), head and scutellum, and in the neuration of the wings, *Charips* agrees with *Sarothrus*.

Black, smooth, shining, antennæ pale testaceous, the basal joint black, the apical joints sometimes pale fuscous. Legs pale testaceous, the coxæ, the femora and tibiæ in the middle obscure fuscous, the abdominal hair fringe dark fuscous. The alar nervures pale testaceous.

Length a little over a  $\frac{1}{4}$  of a line; alar. exp. 1 line.

## CHALCIDIDÆ.

### MEGASTIGMUS PICTUS.

*Torymus pictus*, Foerster, Beitr. z. Mon. d. Pter.  
p. 31.

*Megastigmus strobilobius*, Ratz., Ichn. d. Forstins. ii.  
p. 182.

*Megas. pictus*, Mayr, Verh. z. b. Ges. Wien. xxiv.  
138.

This rare species is British. I have examined two specimens—one taken by the Rev. T. A. Marshall, in England, and another captured near Dumfries by myself. According to Ratzburg, it lives in pine cones, probably as a parasite of *Tortrix strobilana*. It appears to be rather an uncommon insect, for Mayr had only seen three specimens.

The other British species of this genus known to me are—*M. stigmaticans*, Fab. = *giganteus*, Walk., which is a parasite of *Cynips Kollari*.

*M. dorsalis*, Fab. = *Bohemanni*, Ratz. = *xanthopygus*, Foer., a common and very variable species, in many oak galls.

*M. aculeatus*, Svederns (*sec.* Thoms.) = *collaris*, Boh. = *transversus*, Walk. = *punctum*, Foer. = *vexillum*, Ratz. This is a parasite of *Trypeta continua*, Meig., a dweller in the berries of the rose.

*Torymus azureus.*

*Torymus azureus*, Boheman, Vet. ac. Handl. 1833, 369; Mayr, *l. c.* p. 100, 11; Thomson, Hymen. Scand. iv. 84, 5.

*Torymus chalybæus*, Ratz., *l. c.* i. 179.

For specimens of this unrecorded British species I am indebted to Dr. Buchanan White, who bred them from the larvæ of *Eupithecia togata*, found in pine cones near Perth.



VII. *Descriptions of new species of Hemiptera, collected by Dr. STOLICZKA during the Forsyth Expedition to Kashgar in 1873—74.* By W. L. DISTANT.

[Read April 2nd, 1879.]

THE following descriptions will hereafter appear at somewhat greater length and with more comparative detail and figures in the general work on the scientific results of the expedition, now in course of publication at Calcutta. I cannot, however, allow this opportunity to pass without recording my sense of the obligation I am under to Dr. O. M. Reuter and Dr. Sahlberg for very valuable and cheerfully-accorded assistance in determination of some species belonging to the obscure groups which they have made their especial study.

*Dalpada confusa*, n. sp.

Luteous, thickly covered with green punctures. Head emarginate in front with the sides reflexed, and some small indistinct ochreous markings at base. Antennæ pitchy, each joint luteous at base, basal and apical joints smallest, 2nd shorter than 3rd, 3rd and 4th subequal. Rostrum just passing posterior coxæ, with the tip pitchy. Pronotum somewhat transversely gibbous at base in a line with lateral angles, after which it is abruptly deflexed towards head, lateral angles prominent, subacute, lateral margins denticulated for about half their length from apex; the punctuation is very dense along the lateral margins and at pronotal angles. Scutellum somewhat gibbous at base, deflexed towards apex, where it is more sparingly punctured. Corium with a faint impunctate longitudinal line on disc, extending from base to about two-thirds its length, rather widened at apex. Membrane extending beyond apex of abdomen, pale fuscous with the nervures dark brown for half the length from base, followed by a row of four brown spots and a marginal row of six spots of the same colour, the two outer ones being long and linear. Underside of body luteous, with the pectoral and abdominal margins broadly punctured with green, sparingly on

abdomen, and more densely on prosternum ; legs luteous, thickly spotted with brown ; tarsi luteous, apical joint pitchy.

♂. Long. 14 mill. ; lat. pronot. ang.  $6\frac{1}{2}$  mill.

♀. Long. 15 to 16 mill. ; lat. pronot. ang.  $7\frac{1}{2}$  mill.

Murree.

*Palomena Reuteri*, n. sp.

♂. Green ; head, anterior border of pronotum, basal half of scutellum and membrane, bronzy. Head obscurely rugulose, very thickly and strongly punctured with black, central lobe slightly shorter than the lateral ones. Rostrum luteous, with the tip black. Antennæ luteous, apical joint somewhat fuscous, 3rd joint distinctly longer than the 2nd, rather shorter than the 4th, 5th longest. Pronotum obscurely rugulose, very thickly and strongly punctured with black, with two slightly waved, lateral, linear impunctate foveæ situated a little behind the anterior margin ; lateral angles somewhat prominent and rounded. Scutellum thickly covered with deep black punctures, slightly rugulose at base. Corium thickly and deeply punctured with black. Abdomen above black, thickly and finely punctured with the connexivum luteous, punctured with black. Body beneath pale luteous, slightly clouded with greenish. Legs greenish, tarsi luteous.

♀. Second joint of antennæ distinctly longer than the 3rd, 2nd and 4th subequal. Abdomen beneath, with some irregular obscure black markings.

Long. 11 to 12 mill ; exp. pronot. ang. 6 to 7 mill.

Murree.

*Menida distincta*, n. sp.

Luteous, covered with strong greenish-black punctures. Head luteous, with the lateral margins and four longitudinal furrowed punctured lines greenish-black. These lines are much more distinct on the ante-ocular portion of the head. Eyes dull ochreous. Antennæ pilose, with the 2nd joint shorter than the 3rd, 4th and 5th subequal, rather longer than 3rd ; first 3 joints luteous, apex of the 1st, and apical half of the 3rd, black, 3rd and 4th joints black, narrowly luteous at base. Rostrum luteous, apical joints pitchy. Pronotum with an anterior submarginal line of greenish-black punctures, and two irregular transverse ocellated punctured marks of the same colour on anterior portion of the disc. Scutellum with a large



central subbasal greenish-black spot, and two small and somewhat indistinct ones of the same colour situated on the lateral margins a little before apex. Membrane transparent, whitish. Abdomen above black, connexivum luteous, spotted with black. Underside of body and legs luteous, sparingly and distinctly punctured with black. Tarsi pitchy.

Long. 6 mill.

Murree, Sind Valley.

*Eurydema Wilkinsi*, Osch. in litt.

Pale luteous, somewhat thickly and coarsely punctured; head with the anterior portion of the submarginal lateral borders, and a large triangular marking at base; pronotum with two large discal subquadrate linear markings, elongated exteriorly; scutellum with the base and two central forked lines extending therefrom to about middle, and two spots on lateral margins a little before apex; corium with two claval streaks; a linear spot on centre of outer margin; a transverse-waved fascia, extending from base of membrane for two-thirds across corium, and a rounded subapical spot, shining green. Abdomen above luteous, apical segment black, connexivum with a row of large green spots. Underside of body pale luteous. Abdomen with a marginal row of spots situated on the outer edge of each segmental suture, and a submarginal row of transverse slightly-waved linear markings, situated on centre of each segment, greenish-black. Sternum with some irregular markings of the same colour. Legs pale luteous, streaked with greenish-black, and femora obscurely annulated with the same colour near apex. Antennae black, 2nd joint about as long as 1st and 3rd together, 4th somewhat dilated, about equal in length to 5th. Rostrum luteous, pitchy at base and apex.

Long. 7 mill.

Yangihissar.

Dr. Reuter informs me that this species has been sent under the above unpublished name from Turkestan. I therefore conserve it. In most specimens the markings on the pronotum are not perfectly subquadrate, but disjointed; I have, however, thought it best to describe the specimen submitted to Dr. Reuter and returned as above.

*Arocatus pilosulus*, n. sp.

Testaceous, pilose. Head with the central portion

black. Antennæ black, pilose, 2nd joint rather the longest, 3rd and 4th subequal. Rostrum pitchy. Pronotum obscurely punctured, distinctly rugulose on posterior portion; anterior portion crossed with a transverse black submarginal band, and an obscure pitchy band on posterior border. Scutellum pitchy, with the tip red, and with two large round foveæ at base. Corium suffused with dull-pitchy shadings. Membrane pitchy opaque, outer border pale transparent. Underside of body testaceous, strongly suffused with pitchy shadings. Sternum with a submarginal row of three black spots, placed one on prosternum, one on mesosternum, and one on metasternum. Legs pitchy, pilose. The corium is more densely pilose than other parts of the upper surface.

Long. 6 mill.

Murree.

*Phytocoris Stoliczkanus*, n. sp.

Uniform pale ochraceous. Head with a V-shaped mark, consisting of small transverse striæ, commencing from near base of antennæ. First joint of antennæ almost as long as head and pronotum together. Pronotum with two slightly-raised transverse callosities extending across and occupying the anterior border. Scutellum with the base somewhat raised and gibbous, a waved transverse cordate line near base, and a faint pale longitudinal central line near apex. Hemielytra sparingly clothed with a few minute blackish hairs. Membrane with bright prismatic reflexions.

Long. 6 mill.

Murree, Jhelam Valley, Sind Valley.

*Calocoris Stoliczkanus*, n. sp.

Ochreous clouded with brown, and sparingly clothed with pale yellowish pile. Antennæ brownish, 2nd, 3rd and 4th joints with the apices pitchy. First joint robust, 2nd somewhat suddenly thickened towards apex, 3rd and 4th very slender, 4th not much more than half the length of the 3rd. Cuneus somewhat paler in colour than corium, brownish and pilose at base, and with a small pitchy spot at apex. Membrane pale fuscous clouded with brown. Underside pale obscure ochreous, clothed with fine pale yellow pile, and a somewhat obscure stigmatal row of small brown spots. Legs mutilated. The pronotum is

faintly angulose, and the scutellum somewhat more plainly strigose.

Long. 8 mill.

Murree.

I have placed this species in the genus *Calocoris*, though as Dr. Reuter writes me, after his own examination, "*Calocoris*, vel n. gen."

*Calocoris Forsythi*, n. sp.

Brownish testaceous. Antennæ with the 1st joint not quite so long as head and pronotum, 2nd slightly and gradually thickened towards apex, 3rd pale luteous at base, 4th wanting. Head with a deep central longitudinal incision between the eyes. Pronotum, rugulose faintly anteriorly and more distinctly towards posterior border. Hemelytra slightly pilose, somewhat paler towards costal margin, and with extreme outer margin somewhat obscure pitchy. Membrane pale fuscous, somewhat clouded. Scutellum obscurely and transversely strigose. Underside of body castaneous. Fore legs ochraceous, tibiæ with a longitudinal row of small brownish spots. Other legs wanting.

Long. 7 mill.

Murree.

*Reduvius (Harpiscus) Reuteri*, n. sp.

Black, shining, trochanters and bases of femora sanguineous.

Allied to *R. morio*, Kol. Dr. Reuter has kindly compared the two species for me, and writes:—"R. (*Harpisco*) *morioni*, colore similis, sed major et in omnibus latior, magis nitidus, pedibus pilis exsertis longis destitutis, capite pronoti lobo postico tantum paullo longiore, trochanteribus basi que ipsa femorum rufis divergens. *Obs.*—Gula nigra, ut in morione."

Long. 20 mill.

Sind Valley.

*Gerris (Limnotrechus) Sahlbergi*, n. sp.

Head thickly covered with olivaceous pubescence, with a small black spot on vertex. Antennæ ochraceous, 1st joint longest, 2nd and 3rd shortest and subequal, 4th rather longer than 3rd, thickly covered with greyish pile. Pronotum ochraceous, pubescent, anterior third,

lateral borders, and a central longitudinal line olivaceous; the last is testaceous on anterior portion of pronotum. Hemelytra brownish testaceous, with the nervures olivaceous. Underside of body covered with greyish pile, except lateral borders, apex and central portion of abdomen, which are ochraceous. Legs ochraceous, fore femora with an outer longitudinal black fascia.

Long. 10 mill.

Neighbourhood of Leh.

*Halobates* (?) *orientalis*, n. sp.

Brownish ochraceous, finely pilose. Antennæ with the 1st joint curved, robust and about the length of head and pronotum together; remaining joints more slender, 2nd and 3rd subequal, 4th a little shorter than 3rd. Pronotum with a central pale longitudinal line and a large rounded fovea on posterior portion of disc. The rostrum is 5-jointed. The first two joints are very robust, somewhat fused together, the 2nd minute and much shorter than the 1st, the 3rd much the longest, rather less robust than 1st and 2nd, 4th small, slender and black, 5th ochreous, very slender and hair-like, rather shorter than 4th. Sternum clothed with greyish pile.

The eyes are large, semi-globular and castaneous, situated at base of lateral margins of head. The pronotum is about the length of the head, but broader, truncate in front and rounded behind; mesonotum and metanotum hardly distinguishable, much longer than pronotum, and gradually and regularly widened posteriorly. Legs ochreous, fore femora much thickened.

Long. 7 to 8 mill.

Jhelam Valley.

I have placed this species provisionally in the genus *Halobates*, to which it has great affinity; its anatomical peculiarities and sexual appendages will hereafter be figured.

VIII. *Observations of the effects of low Temperatures on Larvæ.* By ELEANOR A. ORMEROD, F.M.S.

[Read April 2nd, 1879.]

DURING the course of the recent severe winter, the unusually long duration of low temperature, with the occasional fall much below the average, suggested it would be a good opportunity for observing whether—(according to the popular idea that frost “kills the grubs”)—the larvæ exposed to the full rigour of cold were materially injured by it.

I was only able to procure specimens of a few kinds, but in every case, whether Coleopterous larvæ in the ground, under bark, or in unprotected galls; Lepidopterous larvæ or pupæ in wood, in the ground, or exposed to the air; several species of Cynipideous larvæ in galls; and a few insects in various stages on bark; and (passing on to the *Acari*), in the case of the bark mites, and also of the *Phytopti* of the filbert bud-galls, I scarcely ever found the slightest appearance of injury from the frost beyond temporary suspension of the powers of movement.

I had the opportunity of making the observations in connection with daily notes of the temperature, and should be glad if a few of the details, given as shortly as possible, are of sufficient interest for me to be allowed to offer them.

During December the minimum shade temperature at four feet from the ground varied, on eighteen successive nights, from as low as nine to no higher than twenty-nine degrees; during January, from ten degrees and a fraction to thirty degrees on twenty-five nights, and during this time the minimum on the grass read down (omitting fractions) on various occasions to nine, eleven, thirteen, sixteen and seventeen degrees,—twice to eighteen,—six times to twenty degrees, whilst the frost penetrated so deeply into the ground, that during several days in December, and from the 12th of January to the 6th of February, the earth thermometer showed a temperature

of only thirty-two degrees and a fraction, at one foot below the surface. In other words, the air temperature was much below freezing-point for a large proportion of the time, and the soil frost-bound for nearly a foot down, its condition being made worse for animal life by the occasionally melting snow soddening, and re-freezing on the surface.

In the case of the larvæ of the *Ceutorhynchus sulcicollis* (the cabbage and turnip gall weevil), I had a large number of cabbage plants brought in for examination on the 4th of February from a spot where they had been exposed to the full severity of the weather, with the galls either on the ground level or an inch or two beneath it. Of these I examined thirty-seven simple or compound galls containing one to four larvæ apiece, and found that with a single exception every larva was alive and healthy. On opening the galls the larvæ were usually lying quite torpid in the slightly-curved position natural to them in repose, and uncurled gradually, and regained power of movement under the action of warmth. Some recovered immediately, others in one or two minutes, and such as still remained motionless whilst in the cold gall, or on the blade of a knife, moved again when breathed upon or otherwise warmed. I also noticed that the larvæ in such of the galls as had been nearest the surface, or completely on the ground level, were generally the slowest to recover.

The seventy or eighty larvæ which I examined were of all sizes, from the minutest observable by the naked eye lying in the still-forming gall to full-, or nearly full-grown specimens, almost ready to leave the hollowed chambers in which they lay amongst the rubbish and rejected matter of their workings.

On thawing back into their normal physical condition their normal instincts appeared also in full play, for on being placed on soft earth they made their way (as usual on removal from their galls) into the soil, and I found (by subsequent examination) formed their oval earth-cases as in ordinary circumstances. I also found specimens of *Ceutorhynchus sulcicollis* larvæ on the 9th of February in turnip galls which had been fully exposed to the severity of the weather; these were in full health after the temporary thaw, in every gall that I opened.

In the case of Coleopterous larvæ in earth I found those of *Otiorhynchus sulcatus*, on the 26th of January, contained in earth in flower-pots (frozen so hard as to

require blows of a hammer to break it) lying perfectly stiff and motionless, the surface temperature at the spot having stood at various heights, from eighteen to twenty-eight degrees, on the ten previous nights. On examining again on February 7th after the thaw, I found the larvæ (with one exception) perfectly well, and recovering power of movement on being placed in moderate warmth.

Larvæ of *Scolytus destructor*, motionless in elm bark about two feet from the ground, on the 5th of February were also perfectly healthy in almost every case, and recovered power of movement on being brought into a warm room after lying for the night in a temperature of about forty-three degrees.

Of Lepidopterous larvæ I was only able to observe a very few specimens, but I found a caterpillar, apparently of the Cabbage Moth—*Mamestra Brassicæ*—(but from the ill-defined colouring, not distinguishable with certainty from that of *Triphæna Pronuba*), perfectly well and thriving when dug up during the frost, and again, on the 1st of March, at a depth of only two or three inches underground. Larvæ of *Zeuzera Æsculi* on the 7th of February, and a few days later were well and active in holly stems, of which one was only thick enough to allow good accommodation for the larva, and consequently could have given little protection from cold.

Of *Pieris* pupæ I had only just enough to show *Pieris Napi* torpid with cold when brought in, but recovering power of contortion next day and continuing healthy and lively on disturbance. Another pupa-case (much faded but apparently also of *P. Napi*), was quite full of healthy Ichneumonideous larvæ, motionless at first, but, like the other larvæ, shortly recovering power of movement.

In the case of Cynipideous larvæ of various species I found inquilines of *Cynips Kollari* generally alive and well; the larva of *C. Kollari* itself was of course only to be met with exceptionally, and I noticed in one specimen (and in a very slight degree in some of the inquilines) that the grubs were not as fat and firm as in their autumn state; the segments near the head especially looking as if their contents had been absorbed, and flaccid and impalpable to touch. The larvæ of the *Quercus cerris* (acorn-gall) appeared well, and were of particular interest from this being the second winter they have passed in the larval state. I found the specimens beneath one of the Lucombe oaks at Kew in the autumn of 1877, and they

appear to be of the *Andricus glandium* of Giraud; but at present, from this singular duration of the larval condition (which is mentioned by Dr. Gustav Mayr in the case of his own larval specimens), we have not secured the imago as an English species.

I also found a scale insect of *Aspidiotus conchiformis* on apple bark, with its large eggs apparently perfectly uninjured; a very few specimens of *Thrips*, alive and uninjured; and also specimens of a few other insects in various stages, but not in sufficient numbers to be noteworthy. The *Acari* appeared to be even less susceptible to cold than the insect larvæ.

On the 24th of January (when the highest temperatures had been below thirty-two degrees for some days and the minima at night ranging between eighteen and twenty-seven degrees), I found two species of the bark mite apparently uninjured, the larger ones in very great numbers, and rousing into activity on being brought into the warm room, and the smaller also perfectly recovering. I am not able to differentiate the species with certainty, but they were fully-developed specimens: in the one case with the single claw characteristic of the common *Acarus geniculatus*, and in the other with the claw trifold and heterodactylous.

I also found enormous quantities of the *Calycophthora avellanæ* of Amerling (the *Phytoptus* of the filbert and hazel bud-galls), on the 2nd and 3rd of February, in perfect health, inside the diseased bud growths, and in such great numbers that the masses might even be detected by the naked eye, and amongst them I was fortunate enough to find a good specimen of the egg with the young *Phytoptus*, showing well under a high power, through the transparent pellicle. I much regretted not being able to find more kinds of insects for examination, but (in all I saw) the effects of the cold appeared to pass away on the insect (in whatever stage) being thawed, leaving it, as far as appeared, in its ordinary condition.



IX. *Notes on the Cases of some South Brazilian Trichoptera.* By Dr. FRITZ MÜLLER.\*

[Read May 7th, 1879.]

LITTLE is known about the cases of extra-European Trichoptera. A short account of those observed by me in Southern Brazil may therefore be of some interest.

Of the seven families into which Trichoptera are at present divided, only five have as yet been found here, viz., *Sericostomatidæ*, *Leptoceridæ*, *Hydropsychidæ*, *Rhyacophilidæ* and *Hydroptilidæ*. These may be grouped into two main divisions according as their pupæ are active or inactive. In the first group, comprising the *Sericostomatidæ*, *Leptoceridæ* and *Hydropsychidæ*, the case of the pupa is provided with small openings at either end, through which a continual current of water passes moving from the anterior to the posterior extremity. The pupa is in incessant activity to maintain this current; this is done, at least in most species, principally by the appendages at the end of the abdomen, which may be seen playing in the opening at the hind-end of the case. In the second group, containing the *Rhyacophilidæ* and *Hydroptilidæ*, the larva spins a cocoon closed all around, in which the pupa lies quite motionless. This cocoon is either free within the case (*Rhyacophilidæ*), or confluent with the walls of it (*Hydroptilidæ*). The fixity or mobility of the cases does not afford a distinctive character of the two last-named families; for there are not only Rhyacophilideous larvæ living in portable cases and Hydroptilideous larvæ living in fixed ones, but there are even cases fixed and movable at the same time, being fastened by a long flexible string (*Rhyacopsyche*).

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\* Figures and full descriptions of the cases mentioned in the following notes have been sent for publication to the "Archivos do Museu Nacional do Rio de Janeiro."

[Some additional notes appear in the Report of the Proceedings of the Meeting of the Entomological Society, held on the 2nd April, 1879; cf. Proceedings, pp. vi—viii.—ED.]

## SERICOSTOMATIDÆ.

This family, as far as I know, is here represented only by the curious genus *Helicopsyche*, of which I have seen about half-a-dozen species. The case of one species is remarkable for the first built portion of it being straight. When preserved in adult specimens, this oldest portion peeps out from the top of the heliciform case like a little chimney. Most of the larvæ of *Helicopsyche* are rather sluggish animals, often resting motionless on the same spot for the whole day; they then retire into their cases after having fixed them temporarily with some threads of silk, a custom which is to be observed also in various Leptocerideous larvæ. In none of our species have I seen branchiæ, which, according to Brauer, exist in *Helicopsyche ceylanica*. Before passing into the pupa state, the larva shuts its case with a flexible corneous covering, provided in most of our species with a long, simple transverse slit; in one species the margins of the slit are serrated, and in another species there is no slit at all, but a sieve-like spot near the centre of the covering. As to the pupæ, Brauer says, that those of *H. ceylanica* have a pair of hook-bearing corneous patches at the basis of the abdominal segments from the second to the sixth, and there are also five pairs in his figure. This would be very strange, for the number and shape of these patches is generally very constant within the limits of the same genus, and in all our species of *Helicopsyche* there are four pairs only, situated at the basis of the third, fourth, fifth and sixth abdominal segments; each patch bears near its posterior end two or three short, rather blunt teeth, which are directed backwards. There is also, as usually, a pair of corneous patches at the end of the fifth abdominal segment, armed with strong, sharp, curved teeth, which are directed forwards.

One of our species of *Helicopsyche* lives on rocks wetted by the spray of waterfalls; it is by far more lively than the other species. The waterfalls, which are of very frequent occurrence in all our mountain rivulets, are generally frequented by three more species of Trichopterous larvæ, belonging to three different families (*Leptocecidæ*, *Hydropsychidæ* and *Hydroptilidæ*). Now the pupæ of those four widely-different species agree in their feet of the second pair of legs being deprived of the fringes of

long hairs, by the aid of which the pupæ of other Trichoptera swim to the surface of the water when they are about to undergo their final transformation.

In those species of *Helicopsyche*, which I have bred, the perfect insects used to emerge from the pupæ soon after sunset.

## LEPTOCERIDÆ.

Of M'Lachlan's first section of this family I have not yet seen here any species.

### SECTION II.

Two of our genera appear to belong to this section.

#### Genus I.

(Near *Odontocerum*, though distinguished by numerous differences. Antennæ not dentate; eyes of the ♂ very large, meeting on the vertex in one species and nearly so in another; radius of the anterior wings confluent at its apex with the first apical sector, &c.)

The case of the larva is a slightly-curved, cylindrical, firm tube, built with sand grains; the tail-end is closed with a transverse wall, having at its upper or dorsal margin a rather large oval or semicircular opening. Before its change the larva cuts a portion of the tail-end of its tube and then fixes the ventral side of either end and closes them by a single stone (in one species), or by a wall built of several fragments of stone (in a second species), in such a way that there remains at the ventral side of each extremity a narrow crescentic slit, the ventral margin of which is beset with a row of teeth. It is curious that the manner of closing the tail-end should be quite different in the larva and in the pupa cases. The pupa has five pairs of corneous patches at the basis of the abdominal segments (from third to seventh), each of the patches bearing a single blunt tooth, and there is the usual pair of patches at the end of the fifth segment, having two short sharp teeth.

The perfect insects emerge from the pupæ in the evening, generally later than *Helicopsyche*. On this occasion the fasciculate branchiæ of the pupa are shed, like those of *Ephemeridæ*, and this is the most remarkable feature of the genus; for it appears, that in most Trichoptera the

branchiæ of the pupa subsist in the imago in a rudimentary condition.

There are here two species of this genus, differing much in size, the larvæ of which live in clear rivulets; a third species of larvæ, building unusually short and wide tubes, of which I have seen but very few specimens in the River Itajahy, probably belongs to the same genus.

## Genus II. GRUMICHA, of Saint Hilaire.

The wings having no median cell, the insect cannot be placed in M'Lachlan's fourth section, while, by the moderate length of the antennæ and the presence of the apical fork, No. 2, in all the wings it is excluded from Section III. Thus I place it here, though it shows no particular relation to *Odontocerum*. (Spurs 2, 2, 2. Discoidal cell closed, and radius connected to the first apical sector by a transverse nervule in all the wings. Apical forks, Nos. 1, 2, 3, 5 in the anterior, 1, 2, 5 in the posterior, wings.) The well-known black *Dentalium*-like tubes of the larvæ are frequent in some of the larger tributaries of the Itajahy. The larvæ are remarkable for the tibiæ of the hind legs consisting of two joints. The tail-end of the tube is closed with a transverse wall, having a central circular opening. Before its change the larva fixes the mouth-end of its tube by a petiolated disc to some stone or to other tubes of the same species. Clusters of more than a hundred specimens are sometimes found. The mouth-end of the tube is closed with a circular covering, provided with a transverse opening beneath its centre.

### SECTION III.

## Genus I. TETRACENTRON, Brauer.

One species of this New Zealand genus is extremely common here. The larva, which, like those of *Grumicha*, have two-jointed tibiæ on the hind legs, lives in sticks of wood, fragments of branches, of petioles of *Cecropia* leaves, &c. These are hollowed out in convenient lengths, and a semicircular piece is cut away from the ventral side of the mouth-end, so that the dorsal side projects, protecting the larva when crawling about; besides this, for more protection, a small stone is fastened to the projecting dorsal side, which closes the entrance when the larva retires into its case, and covers its head when feeding.

Near the end of the boring a small hole is gnawed through the wall of the stick for the issue of the respiratory current. For its transformation the larva fixes the ventral side of the mouth-end of its case to some stone or tree (preferring the latter, when obtainable), and closes the entrance with a stone; the interior of the stick is clothed with a silken tissue, forming a cylindrical cocoon, closed with a sieve at either end; the centre of the anterior sieve is attached to the stone, which serves as a covering. It often happens that the larvæ find hollow sticks; but even then they gnaw, before their change, a quite purposeless hole through the wall of the stick. (See Kosmos, "Gratulationsheft zum 70 jährigen Geburtstage, Ch. Darwins," p. 395, fig. 6.) The pupæ agree in the number and arrangement of the corneous patches of the abdomen with those of *Helicopsyche*, but each patch is armed with from four to six sharp hooks. The branchiæ of the pupa are not shed in the final transformation; they can easily be seen in the imago when it is put into spirits of wine immediately after issuing from the pupa.

Sometimes tubes of *Grumicha* are met with, which, instead of a corneous covering, are shut with a stone (such were, e. g., the tubes described by Hagen in Stettin. entom. Zeit. 1864, p. 226), and these, on examination, are found to contain pupæ, not of the maker of the tube, but of an intruding *Tetracentron*. I do not know whether it is a distinct species.

In some small mountain rivulets I have found tubes of various smaller *Leptoceridæ* (*Setodes* (?), *Grumichella*, &c.) tenanted by intruders, which have the curious habit of fastening to the mouth-end of the tube bits of wood or sticks, sometimes much longer than the tube, and concealing it almost completely. I have not yet seen the imago, but the larvæ agree (e. g., in the two-jointed tibiae of the hind legs) with those inhabiting hollow sticks.

## Genus II. GRUMICHELLA, nov. gen.

(Very nearly related to *Leptocerus*. The neuration of the anterior wings is quite the same; in the posterior wings apical fork No. 1 is wanting, while Nos. 3 and 5 are present in both sexes. Proportion of the joints of the maxillary palpi 10, 15, 20, 9, 17.)

The larvæ inhabit waterfalls and rapids of mountain rivulets. But for size their tubes closely resemble those

of *Grumicha*, which are thrice as long. It is rather curious that those almost identical tubes should belong to species quite different in their larval, pupal and imago states.

The tubes of *Grumichella* show two interesting contrivances, by which they are adapted to their peculiar habitat—1, from the wall which closes the tail-end of the tube, and which has, as in *Grumicha*, a central circular opening, there projects, on the ventral side of the opening, a short, stout, triangular tooth or spur, which, being inserted into minute crevices of the rocks, probably serves to give hold to the tubes; 2, the little petiole or foot-stalk of the disc, by which the pupa case is fastened, does not proceed, as in *Grumicha*, from the margin of the tube, but from the corneous covering. The pupa cases being usually fastened with the mouth-end turned upwards to perpendicular rocks, along which a thin sheet of water is pouring down, if the tubes were fastened, the pupæ, after having loosened the covering, would hardly be able to creep out of their tubes, and, if they succeeded in doing so, the tender, fragile creatures would almost infallibly be crushed. But now, after loosening the covering which remains fastened to the rock, they are within their tubes safely carried away by the water to some quiet place, where they may with leisure creep out and undergo their final transformation. The pupa is remarkable for its last abdominal segment being unusually long (as long as the three preceding ones), and tapering towards the end. Number of dorsal patches as in *Helicopsyche*, each patch armed with two short, sharp teeth.

### Genus III. SETODES (?).

There are here three species agreeing in general appearance and in the neuration of the anterior wings (one of them even in colouring) with *Setodes punctata* and *viridis*; but the posterior wings are broader.

The larvæ, the antennæ of which are longer than in any other Leptocerideous larva known to me, live in narrow, cylindrical, straight or slightly-arcuated leathery tubes. Before its change the larva considerably shortens its tube, the ventral side of either end of which is then fixed by means of a disc, usually bilobed, and the extremities closed with coverings having a central circular or elliptic opening. The appendages at the end of the

abdomen of the pupa are very long; the number of the dorsal patches is as in *Grumichella*, &c., those at the basis of the 4th, 5th and 6th segments have two or three teeth, but those at the basis of the third and at the end of the fifth segments have two pairs of teeth, those of one pair being much smaller.

In one of the three species the slightly-arcuated brown tubes are covered with very fine sand; the larvæ of this species swim very well, their hind legs being furnished with long fringes. The imago is the most beautiful Trichopterous insect I have ever seen.

In the second species the straight tubes are covered with narrow bits of wood or other vegetable fibres; those on the back are arranged longitudinally, projecting considerably beyond the mouth-end of the tube; those on the sides and beneath are disposed in an oblique direction.

In the third species to either side of the back of the straight tube there are fixed a row of bits of wood, projecting laterally, and generally decreasing towards the tail-end.

#### Genus IV.

From the great length of its hind legs I suppose that a little larva, which makes curious nearly cylindrical cases with the seeds of *Callitriche*, must be placed in this section.

#### SECTION IV.

The cases of the three species of this section, with the larvæ of which I am acquainted, differ from those of all other *Leptoceridæ* by their inner silken tube being much flattened, the height being equal, or nearly so, to half the breadth. The external aspect of the cases is yet much more flattened and broad; for they are covered with bits of leaves, which laterally project more or less beyond the inner tube.

In the largest species the cases of adult larvæ are usually made of four leaves (sometimes there are but three), two forming the ventral and two the dorsal side; the anterior dorsal leaf is produced far over the ventral one, so as to protect the larva when moving about. This species lives in rivulets. The case of the pupa is fixed at the mouth-end, either extremity of the interior tube being closed with a sieve.

In the smallest species, which lives on trees between

the leaves of *Bromeliæ*, there are generally five or six bits of leaves on the ventral, and one more (six or seven) on the dorsal side of the tube. Before its change the larva closes the mouth end by fastening one more bit of leaf to the ventral side.

This is also done by the third species, intermediate between the other two in size as well as in the number of leaves used in the construction of its case; there are generally three or four on the ventral and four or five on the dorsal side. This species lives principally in very small rivulets; with hardly any water, trickling along a declivitous rocky ground.

To the different habitat of these three species corresponds a remarkable difference in the feet of the pupæ. In the first species there are not only dense fringes of long hairs on the second pair, but similar hairs, though much less developed, exist also on the feet of the fore-legs. These fringes are rather rudimentary in the third species, and completely wanting in the *Bromelia* species, which in this respect agrees with the waterfall Trichoptera.

The pupæ have more dorsal patches than any other of our *Leptoceridæ*; for there is a pair on the eighth abdominal segment also, and besides this, there is on the back of the ninth segment a pair of long spear-shaped horny processes.

The first species emerges from the pupa in the evening, as most *Leptoceridæ* do, but the *Bromelia* species usually during the first hours of the afternoon (at least in captivity). The branchiæ of the pupa subsist, in a rudimentary condition, in the perfect insect.

The three species agree, not only in the construction of their cases, in the structure of their larvæ and pupæ, but also in the neuration of the wings and other characters of the perfect insects (in all the wings the radius is confluent at its apex with the first apical sector; in the posterior wings the discoidal cell is open, the apical forks Nos. 2, 3 and 5 being present). It would be most unnatural to separate them into two genera, and yet they differ in the number of spurs. In the *Bromelia* species there are 2, 4, 2 in both sexes, while the other two have 2, 4, 4. In any other respect the intermediate species resembles more closely to the *Bromelia* species than to the larger one, with which it agrees in the number of spurs.



## HYDROPSYCHIDÆ.

## Genus I. MACRONEMA.

The larva of one species is extremely common, being met with almost everywhere under large stones. The larva makes a very rude dwelling with irregularly-accumulated and loosely-connected stones. The case of the pupa is by far more solid and regular, at least when viewed from within. The inner room is oval, the surface smooth, and the stones of the wall firmly connected. At either end a few small openings may be detected, leading through the wall. Within the case there is a cylindrical silken cocoon, which is loosely connected with, but may be easily separated from, the walls of the stone-case, and which has a transverse sieve at either end.

## Genus II. TINODES (?).

Cases similar in general appearance to those of *Tinodes maculicornis* are very common on rocks exposed to the spray of waterfalls. They consist of a soft silken ribbon interwoven and covered with microscopical algæ, diatoms and mud, and curved into a semicylinder. These canals without a basal wall can hardly be called "tubes." The larva is remarkable for its very long spinneret, which projects beyond the head. I have not yet seen the imago.

## Genus III.

I do not know the imago; in the pupa I found 2, 4, 4 spurs. The cases, of which I have seen but very few specimens in the River Itajahy, are interesting on account of their close resemblance to those of the Hydroptilideous genus *Peltopsyche*; indeed, before I had an opportunity of examining the larvæ and pupæ I supposed them to be some new species of *Peltopsyche*, or even unusually large specimens of *Peltopsyche Maclachlani*. They are flat, elliptical, smooth, buff-coloured shields, with a small opening at either end, fixed to the upper side of stones,

## Genus IV. RHYACOPHYLAX, nov. gen.

(Appears to be nearly related to *Smicridea*, but the number of spurs is different, being 1, 4, 4 in the ♀, and 1, 4, 2 in the ♂.)

This is, no doubt, as to the cases, the most curious of all our *Hydropsychidæ*. The cases themselves are rather rude canals, covered with irregularly-interwoven vegetable fibres, but at its mouth-end each case has a large funnel-shaped verandah, covered with a very beautiful silken net. The larvæ live in the rapids of various rivulets, and the entrance of the verandah is invariably directed towards the upper part of the rivulet, so as to intercept any eatable things brought down by the water. Generally, a more or less considerable number of larvæ build their cases close together, so as to form transverse rows, on the upper side, of stones. Lately, I saw, on a large stone, about half-a-dozen parallel rows, at some distance from one another; one of them, being about 0.2 m. long, must have been composed of about thirty cases. Before the end of the larval period the vegetable fibres are replaced by small stones, and the verandah is destroyed, either by the larva or by the current of the water. One day, when I was taking to my house a stone with beautiful *Rhyacophylax* cases, some of the larvæ left their houses, crept to the edge of the stone and then descended, suspending themselves in the air, like spiders, by a thread of silk. The larvæ of *Grumichella*, also, may be seen suspending themselves in the water in a similar way. Such a faculty must prove highly serviceable to larvæ living in rapids, where they might otherwise be easily swept away by the current.

## RHYACOPHILIDÆ.

## Genus I.

(Spurs of a ♂ pupa 2, 4, 4.)

The larva lives, principally, without any case, between the entangled stems of various *Podostemeæ*, which densely cover the stones in the rapids of the Itajahy and its tributaries. It is carnivorous, fragments of insect larvæ (*Hydropsychidæ*, *Perlidæ*, &c.) being found in its intestines, and its anterior legs are armed with very

powerful and curious forceps; the femur is very thick, and has on its distal inferior angle a stout process, resembling the thumb on the hand of a crab; the tibia and tarsus are extremely short, so that the curved claw impinges against the process of the femur. The cocoon of the pupa, also, is not protected by a regular case; sometimes there are some loosely-connected stones around it, but at other times it appears to lie, without any special protection, between the *Podostemeæ*. The feet of the first and second pair of legs are provided in the pupa with strong well-developed claws, which I have not yet seen in any other Trichopterous pupa. They are, probably, very useful to the pupa of this species, which has to make its way between the densely-intricate stems of *Podostemeæ*.

## Genus II.

The larvæ of some smaller species of *Rhyacophilidæ* build portable cases, agreeing with those of most *Hydroptilidæ* in not showing any difference between the two extremities. They are built of stones, oval, with a flat bottom, on either end of which there is an opening; the stones generally being of comparatively large size, the external aspect is often very irregular. As the two doors of these little stone-houses are in the flat bottom, they would not freely admit the water necessary for respiration, when the larva is at rest, and there are special contrivances for the access of water varying in the several species. In one species, frequenting small mountain rivulets, small passages are left between the stones of the dorsal side of the house. In another species, which often covers by countless thousands the stones in clear streams, an upright cylindrical chimney, made of grains of sand, rises from the middle of the house; its height sometimes equals, or even exceeds, the length of the house. When the larva is about to change, the bottom and chimney are removed, the borders of the vault are fixed to the stone, on which it lives, and then a cocoon of the usual form is spun.

## HYDROPTILIDÆ.

In Hagen's list of South American Neuroptera (Synopsis of the Neuroptera of North America, 1861, p. 299), no species of this family is mentioned, and yet it will probably

prove to be one of the most numerous Trichopterous families in this country, including the most varied and remarkable larval cases.

### Genus I.

There are here various species, the cases of which resemble more or less closely the well-known cases of *Phrixocoma pulchricornis*, being much compressed from the sides and opened by a narrow slit at each end. They are either naked, or covered with very fine sand, or with algæ or diatoms, which in one species are arranged in an extremely elegant manner. The cases of the pupæ are fixed either along the whole ventral margin or at the two ends, or in one species, abounding on the rocks of waterfalls, at one end only.

### Genus II.

Very minute, nearly cylindrical, coriaceous, brown tubes; covered with very fine sand, which in the pupa state are fixed at either end to the underside of stones, showing generally two adhesive discs on the anterior, and a single one on the posterior end. They are common almost everywhere.

### Genus III. DIAULUS LADISLAVII.

Strongly-compressed oval cases, elegantly covered with diatoms, with a narrow slit at each end, and having on the dorsal margin two (or, as I have seen in one specimen, three) cylindrical chimneys. The observation of living larvæ of this and of the first genus leaves no doubt as to the use of the chimneys. Those inhabiting cases opened only by a slit at each end are seen moving incessantly, and working very hard, in order to maintain a current of water through these narrow passages; those of *Diaulus*, on the contrary, may remain motionless for a very long time, the water necessary for respiration having a free access through the chimneys. The cases of the pupæ are fixed in an upright position along the whole ventral margin on the upper side of stones, and often these little houses form large villages of a rather picturesque aspect.

### Genus IV. LAGENOPSYCHE.

An approximative idea of the cases may be formed by imagining the bottom of a bottle to be cut away and then

its under part to be compressed until the opposite sides touch each other, thus transforming the wide circular opening into a narrow slit. The mouth of the bottle represents the mouth-end of the larval case, and the long narrow slit at the tail-end is held in an upright position. In one species (*L. hyalina*) the case is quite colourless and perfectly hyaline; in a second species (*L. Spirogyræ*) it has a dark violet, or brownish, or blackish, colour, darker towards the mouth-end. For transformation the case is placed on one of its broad sides, and then fixed on either side of each end by means of petiolated discs; at the mouth-end of the larval case there are two discs in both the species, and as many exist at the opposite end in *L. Spirogyræ*, but in *L. hyalina* there are four, the petioles dividing before they expand into discs. After having fixed its case the larva turns its head towards the broader end of it, so that the mouth-end of the larval case becomes the tail-end of the pupa case, and *vice versâ*. *L. hyalina* lives in small rivulets under stones, *L. Spirogyræ* in slowly-moving or even standing waters filled with *Spirogyra*, *Callitriche* and *Heteranthera reniformis*; the larvæ are to be met with among the *Spirogyræ*, on which they seem to feed; the pupæ are fixed to the under side of the leaves of *Callitriche* or *Heteranthera*. The perfect insects emerge early in the afternoon.

#### Genus V. RHYACOPSYCHE HAGENII.

The larvæ live in rapids of mountain rivulets. The brown coriaceous cases of younger larvæ are nearly cylindrical and widely open at each end, afterwards they are widened in the middle, corresponding to the increasing thickness of the abdomen of the larvæ; from one end there proceeds a string of silken threads, generally about as long, but sometimes even more than twice as long as the cases, by which the latter are fastened to the upper side of stones. Thus the larva is secured against being carried away by the current, and at the same time by the mobility of its case its pasture ground is greatly enlarged, and the more so as it can issue indifferently at either end of its tube. It feeds on microscopical algae. Before its change the string is much shortened and thickened, being thus transformed into a rigid footstalk, able to sustain the case

in an upright position. The case of the pupa is somewhat compressed, oval or club-shaped, rounded at the upper, attenuated at the lower, end. The pupa emerges, for its final transformation, at the upper end of the case.

#### Genus VI. PELTOPSYCHE.

The larvæ live in larger tributaries of the Itajahy, preferring rapids. One species (*P. Maclachlani*) has as yet been found only in one single rapid near the mouth of the Warnow. The cases resemble in shape, colour and size the well-known egg-cases of *Nephelis*, and are fixed, often in very large numbers, to the upper side of stones; they are made of a brown, rather tough, coriaceous substance. Their upper wall forms a rather flat elliptical shield, smooth in *P. Maclachlani*, transversely striated in *P. Sieboldii*; the basal wall is very thin, and firmly glued to the underlying stone, so that it can hardly be separated without being torn. At either end of the case there is a small circular opening. In most *Hydroptilidæ* the abdomen of the older larvæ is much swollen; in *Peltopsyche* it is so in a quite extraordinary degree, filling nearly the whole case. The very slender anterior part of the body is bent and hidden beneath the huge abdomen, of which it appears to be only an insignificant appendage. The pupæ are remarkable for the unusually great difference which the complicated corneous patches on the back of the abdomen show in the two species. The perfect insects differ from all known Trichoptera by the antennæ of the ♂, some of the basal joints of which are produced into long processes exhibiting a complicated structure, very different in the two species, and which I have not yet been able to unravel in a satisfactory manner. From what I have seen, I am led to suppose that these strangely modified basal joints of the antennæ may be odoriferous organs.

X. *Morphological Notes bearing on the Origin of Insects.* By J. WOOD-MASON, F.G.S., F.L.S., F.Z.S., Deputy Superintendent, Indian Museum, and sometime Professor of Comparative Anatomy, Medical College, Calcutta.

[Read May 7th, 1879.]

1§. THEIR position relative to the eyes\* and mandibles seems to point to the antennæ of *Machilis* as being homologous with the antennæ (III) proper of Crustacea. These appendages are, in *M. maritima*,† composed, as usual, of a peduncle and of a flagellum: the former consists of a single joint, which is rather broader than long, and slightly enlarges from its insertion to the end of the basal third, where it is thickest, and where a conspicuous sutural mark shows that it is made up of two primitively distinct and separate joints; near its apex, on the inner and inferior side, arises a short conical process, terminating abruptly in a small blunt papilla, from which spring one or two hairs. When the insect is at rest, the antennæ are laid back upon the sides of the thorax, bending at the junction of the peduncle with the setaceous subsegmented flagellum: the first joint of this—little more than half the thickness of the peduncle—is of uniform breadth throughout, almost twice as broad as long, its breadth being to its length as 8 : 5 about, and it is slightly excavated at that part of its wall which, when the antennæ are directed straight for-

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\* Immediately beneath each of the eyes is a conspicuous black and rounded ocellus-like elevation, which may represent the simple eyes of *Peripatus*; they are clearly not identical with the fenestræ of *Blatta*, which are, perhaps, the scars of the lost antennules. It seems to me doubtful whether the antennæ of *Blatta* and *Machilis* homologize with those of *Glomeris*, in which, while the antennæ occupy the place of the fenestræ, a pair of horse-shoe shaped membranous depressions, singularly like the antennary fossæ of a cockroach, is in the position of the antennæ in *Blatta*.

† For the benefit of any one who may wish to obtain specimens of this primitive form of insect for dissection, I may state that the species abounded at the end of April and the beginning of May, 1878, on the huge fallen blocks of Corallian rock that thickly strew the beach under the ruins of Sandsfoot Castle, and on the slabs of stone from the Cornbrash cliffs of the backwater, near Weymouth. All these ancient forms have a remarkably wide distribution.

wards, comes into apposition with the papilla-bearing process of the peduncle.

In an Indian species of *Lepisma* the antennæ are furnished, at the extremity of their two-jointed peduncle, with a minute movably-articulated appendage, exactly corresponding in position to the papilla in *Machilis*, and as firmly chitinized as the basal joint of the flagellum.

Let us see what light lower, that is to say, less modified, air-breathing arthropods throw upon the nature of these rudiments in the *Lepismatidæ*.

It will, doubtless, be in the recollection of many of the members that Sir John Lubbock exhibited at the November Meeting of this Society, in 1866, and shortly afterwards very fully and carefully described in the 'Transactions of the Linnæan Society of London,' a remarkable addition to the fauna of these islands in a new form of Myriopoda, the most striking morphological feature of which undoubtedly is the possession by it of biramous antennæ. In *Pauropus*, as this curious little creature is named, in allusion to the paucity of its locomotor pairs of members, the two antennary branches, one supporting one and the other two many-jointed flagella, are themselves supported upon a peduncle of four joints—a number which has, probably, resulted from the secondary segmentation of two primitive joints, as, in fact, is indicated in Lubbock's figure of a larval stage, though nothing is said about the number of the joints in the accompanying text.

Sir John Lubbock did not fail to remark the singularly close resemblance which the antennæ of *Pauropus* bear to those of many Crustacea; "in their bifid character, and in the possession of long, jointed appendages," they "offer," he says, "peculiarities which can be found, so far as I am aware, among no other terrestrial Articulata, and which remind us strongly of the types presented by the antennæ of certain Crustacea;" and other writers, such as Rolleston, have recognized in them a peculiarity by which "a very distinct affinity is shown to exist between Myriopoda and Crustacea."

If for the movable appendage present in the Indian *Lepisma*, and for the reduced representative of it in *Machilis*, were to be substituted a fully-formed flagellum, in other words, if these rudimentary structures were restored to what I believe to have been their pristine condition, it is obvious that we should then have in each case antennæ in all essential particulars like those of *Pauropus*, or like the antennæ proper (III) of such a Crustacean as



the female of the common *Cyclops* of our freshwaters, or as an ordinary Zoëa, in both of which latter, as in the larvæ of the former, the antennæ similarly consist of a proximal or basal two-jointed portion, the protopodite or peduncle, terminated by two branches, the endopodite and exopodite.

As I had good reasons for believing that the ancient, cosmopolitan, and little-modified group of the cockroaches is directly descended from some extinct form of which the *Lepismatidæ* are the only existing representatives that we know of, I thought that, by carefully tracing the development of the antennæ in some species of it, I should probably find a vestige of a second antennary branch occupying the place of the rudiments in *Machilis* and *Lepisma*. Nor have I been disappointed. In ripe embryos of *Blatta* (*Panesthia*) *Javanica*, which are still invested in a larval skin, the one, probably, that is cast by the young cockroaches at the moment of quitting the marsupium of the mother, the antennæ in all essential particulars resemble those of *Machilis*, consisting of a many-jointed flagellum borne upon a two-jointed peduncle, from the apical joint of which arises a relatively huge somewhat compressed conical process, in the precise place of the papilla-bearing tubercle in *Machilis*. This process seems quite as entitled to be considered a distinct part as is the simple one-jointed antennary (III) endopodite of many Zoëas. It is probably cast off with the skin the young insect sheds on leaving the body of the mother, and to which it appears to belong; be this as it may, no vestige of it is to be detected in the smallest active 'larvæ' of the same species yet examined by me.

There seems to me little doubt that we have here to do with an ancestral phase of the antennæ, a phase in which those appendages each consisted, to use the terminology employed in carcinology, of a proximal two-jointed protopodite, carrying at its extremity a long many-jointed exopodite, and a short and simple rudimentary representative of an endopodite. The ancient condition of things, of which we thus get a passing glimpse in the embryonic history of this cockroach, may be presumed to have been inherited from some extinct form closely resembling the much less modified *Lepismatidæ*, in which also an endopodite is present, though it is reduced to the merest rudiment. In short, in the lowly *Pauropus* we have antennæ with two fully-developed branches; in the higher *Lepismatidæ* the inner of these two branches is reduced to a mere

rudiment, which, however, persists throughout life; and in the still higher cockroach even this is absent in adult life, being only seen as a transient condition in the embryo.

Fig. 1.

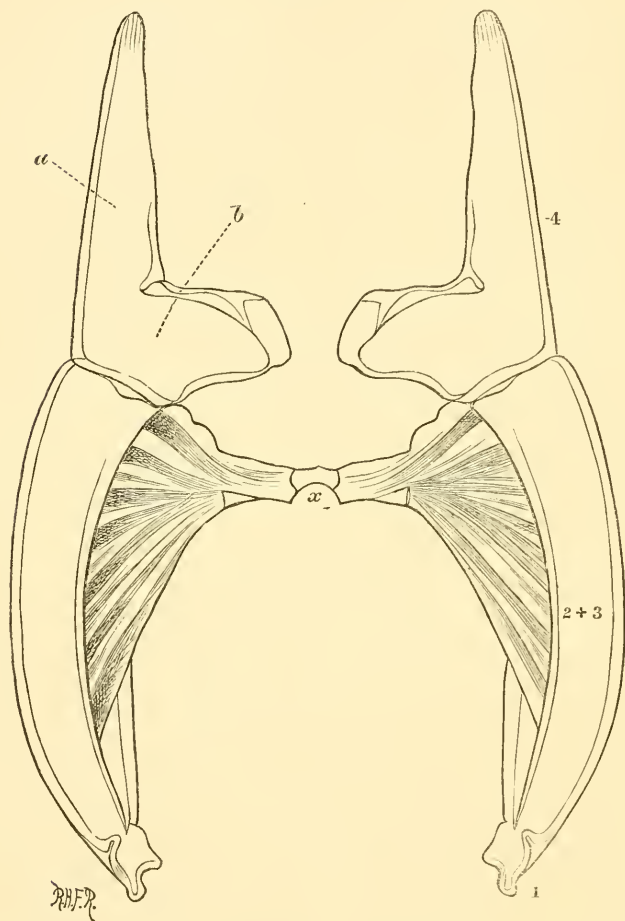


Fig. 1. *Machilis (Petrobius) maritima*. Mandibles, viewed from above; *a*, exopodite, *b*, endopodite, 1, 2+3, 4, the three joints, *x*, median chitinous plate to which the great flexor muscles are attached.

2§. The mandibles (fig. 1) of *Machilis* have been figured in outline, and briefly described by Sir John Lubbock, but both he and all other writers have apparently overlooked

the important fact that these appendages are jointed and articulated to the head just as in the Chilognathous myriopods. The joints, however, are not movable, but, on the contrary, quite stiff, the process of modification suggested below having apparently already commenced. The posterior ball-shaped condyle of mandibulated insects, clearly foreshadowed in the myriopod, is here fully formed and provided with a distinct neck; it is a process of the minute basal joint (1, fig. 1), which is indicated by a distinct inflection of the integument; the second joint (2 + 3) answers to the second and third in the myriopod; and the third and apical free one (4) has a well-developed molar tubercle at the base of its long, knife-shaped incisive process, which is obscurely toothed, or, rather, crenulated, on the inner extremity; it is marked off from the preceding joint by a conspicuous constriction as well as by a circumferential inflection of the integument. The two basal joints form almost the whole of the side of the head, as in the *Chilognatha*, that is to say, roughly speaking, the part corresponding to the so-called 'gena' in *Blatta*; they terminate where the apical joint begins, at a point approximately answering to the position of the 'ginglymus' in *Blatta*. The great flexor muscles are inserted into the inner face of the outer wall, and pass thence through a cleft in the opposite wall of the second joint to be attached to a median chitinous plate; so that, just as in Chilognathous myriopods, the two mandibles come away attached together when it is attempted to dissect out either one of them.

In the ripe embryos of '*Blatta*' (*Panesthia*) *Javanica* previously alluded to, two deep folds\* are to be seen in the integument of the 'back' of the mandible, between the base of the apical crushing and cutting part of the appendage and the condyle; they pass across both sides of

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\* Folds not of the larval skin previously referred to, but of the integument of the enclosed appendage, in the interior of which the definitive non-jointed mandible is plainly visible by transmitted light, and is almost ready for use. In all the ametabolous Insects, the mandibles and the claws of the feet are never for a moment useless to their possessors, but are continuously in use from birth to death, the portion of the thin exuvium that covers the parts being worn away by use, and the new jaws and claws exposed, before the moult takes place. In both the species of *Peripatus* dissected by me, not one only but two pairs of these reserve jaws are present, that is to say, there are two claws in different stages of development in the interior of each of the functional ones. This phenomenon appears to be universal in Arthropoda, Thorell ('Monograph of *Argulidae*') having observed it in *Argulus*, and Hollis ('Journ. Anat. and Phys.'), in some of our indigenous terrestrial Isopoda.

the mandible more or less distinctly, and the apical one of the two is continuous with the outer margin of the fleshy setulose flap that projects from the inner margin of the jaw in all *Blattidæ*; moreover, the part from which the ball-shaped condyle is given off is indicated as a separate piece by a distinct inflection of the integument; so that, counting this last as the first, the two folds as the second and third, and the part of the mandible that succeeds these, and that becomes firmly chitinized at the same time as the condyle, namely, the cutting and crushing apical part, as the fourth joint, we have indicated in the mandible of this embryo cockroach the same number of joints as in that of Chilognathous myriopods, or one less than in that of *Machilis*, in which the second, answering to the second and third of the myriopod and to the two folds in *Panesthia*, may have resulted from the coalescence of two primitively distinct joints.

The setulose flap above-mentioned seems rather to be a mere process of the third segment than a distinct part, such as an endopodite, and it is, besides, quite unrepresented in the far less modified *Machilis*; its apex, in embryo as in adult, is received into a notch specially provided for it in the proximal end of the molar process. It is present as a minute, white, fleshy, naked, and obviously useless rudiment in the nearly related and only slightly more specialized *Mantidæ*, but, so far as I have yet discovered, in no other Orthoptera,\* nor in any Neuroptera, except, perhaps, *Termes*.

In both 'larvæ' and adults of *Panesthia Javanica* a faint groove crosses the 'back' of the mandible at the base; in this Oriental species, eight abdominal terga only are in both sexes visible from above without dissection; but some South American forms are so far less modified than this as to have, in the male, at any rate, ten, the full number of terga externally visible, and it is a significant fact that, in the only one of these I have as yet had an opportunity of examining, the groove is deeper, and at bottom of much lighter coloration than the surrounding chitine. This groove appears to be the remains of the joint between the third and apical segments of the formerly four-segmented mandibles.

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\* Of these, the *Phasmidæ*, at any rate, would appear to differ from the *Mantidæ* and *Blattidæ* in that, in the female, the opening of the pro-genital chamber lies between the tenth tergum and the eighth, instead of the seventh, sternum, and in the male between the tenth tergum and the tenth, instead of the ninth, sternum.

After prolonged study of numerous dissections and preparations, I have arrived at the conclusion that the mandibles of *Blattidæ* are compound structures, each made up of three (or four) such joints as are to be seen in *Machilis*; and I believe that the process of modification by which the head and mandibles of such an insect as *Machilis* have become converted into those of *Blatta* may have been somewhat of this nature; the basal joints have gradually shortened and coalesced with one another until little more was left of them than the ball-shaped condyle; *pari passu* with this change the walls of the head have gradually completed themselves behind the shortening and retiring basal joints of the jaws, so as eventually to form a 'gena,' and finally, a 'ginglymus' articulation was formed by a process sent off from the front of the head to meet a cupped process of the base of the mandible\* of the same side.

3§. Are the mandibles of insects and myriopods, like the jaws of *Peripatus*, modifications of walking-legs? I think not. In the cockroaches, a notch at the extremity of the mandibles on the inner side sharply divides the crushing and cutting portions of those appendages from one another; in the embryos a curvilinear sutural mark extends from the bottom of this notch, and separates the two parts off from one another still more definitely; this is seen better marked in all the species of *Lepisma* (see Lubbock's figure of the mandibles of *L. saccharina*), a form in many respects intermediate between *Blatta* and *Machilis*, and in some of the species of which the apical portion of the mandible closely resembles that of *Blatta*. In *Machilis*, the notch becomes a deep fork, widely separating the two parts, and from its bottom there extends basewards a distinct inflection of the integument. This peculiar feature in the structure of the apical joint seems to me only explicable on the hypothesis that the mandibles of these insects and of myriopods have resulted from the direct modification of such a biramous appendage as is seen in the earliest (*Nauplius*) condition of many crustaceans, the two or three basal joints attached to the head representing the protopodite, and the molar and incisive

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\* The 'ginglymus' is still incomplete in the ripe embryos with which I have worked, and I do not think it is completed till after birth, probably not till the first extra-ovular moult has taken place and removed all traces of segmentation in the mandibles. The embryonic development of the mandibles in *Blatta* repeats the historic development perfectly.

portions of the terminal free joint, the endopodite and exopodite respectively of the embryonic crustacean mandible. If the view here suggested be correct, the possibility of the occurrence of a mandibular palp in insects and myriopods is altogether excluded, the extremities of both the branches of the primitive member entering into the formation of the functional jaw; and the peculiar appendages found on the inner side of the mandibles in many Coleoptera acquire a definite morphological significance, I refer to the 'prostheca' of Kirby and Spence, and to the structures homologous with it in beetles other than *Staphylinidæ*. In the 'Devil's Coach-horses' (*Goërius olens*), in *Staphylinus erythropterus*, and other 'Rove-beetles,' and in the sub-aquatic *Heteroceridæ*, no molar process is developed; but in its place, movably articulated to the jaw, is a membranous ciliated appendage not unlike the endopodites of *Scolopendrella*. I am convinced that this is an endopodite, and that it answers to the molar branch of the jaws in *Blatta* and *Machilis*. It has its homologue in the diminutive *Trichopterygiidæ* in the firmly-chitinized quadrant-shaped second mandibular joint, which is used in a peculiar manner\* in crushing the food. It is represented by the membranous inner lobe of the mandibles in the Goliath beetles of Southern Asia, which inner lobe frequently becomes indurated and grooved internally so as to function as a feeble crusher of the soft food of these insects, in many *Phytophaga*, and in *Donacia*, which is considered by some to bridge the interval between these last and the longicorns; in some of which, as, for instance, in *Batocera*, a wrinkled papilliform scar remains to mark its former presence.†

4§. One of the most interesting and remarkable features in the whole organization of the Thysanura is the presence of abdominal appendages, which, in *Machilis*, are movably articulated to the hinder margin of the sterna of the eight antepenultimate somites, a pair to each somite. Sir John Lubbock was, I believe, the first to put upon record the important fact "that each of the four posterior legs bears an appendage on the basal segment closely resembling the

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\* Mathews, 'Monograph of Trichopterygiidæ.'

† It is probably represented also by the movably-articulated and firmly-chitinized appendage, shaped like the terminal joint of one of the palpi, which I have discovered on one of the mandibles in Australian, Asiatic, African and South American *Passalidæ*. But in this case the large molar surface of the mandible must be a process of the cutting portion.

eight anterior ventral appendages;" but the precise position on the legs which these appendages occupy appears never to have been indicated; they are articulated to the upper

Fig. 2.

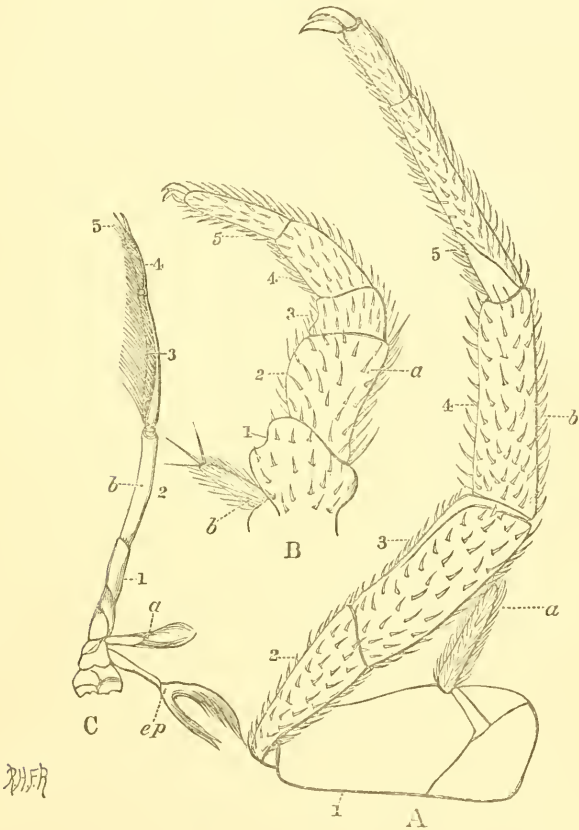


Fig. 2. (A) Metathoracic leg of *Machilis maritima*; (B) leg of *Scolopendrella* sp.; (C) fifth thoracic appendage (XI) of *Penäus Dobsoni*; *a*, exopodite; *b*, endopodite; *ep*, epipodite; 1, 2, 3, 4, 5, the five joints of the ambulatory branch of the limb, which in (A) and (C) is here considered to be an endopodite, but in (B) an exopodite.

and outer edge of the legs at a point where a distinct angulate suture indicates that the coxa is composed of

two parts, a long and broad distal one—the true coxa—and a short proximal one, divided by an evident suture into two. It is clear that these answer to the distal of the two sclerites which are interposed between the coxa and the sternum in *Blatta*, and which, in my opinion, are both basal joints of the leg. In *Machilis*, owing to the softness and delicacy of the integument at the setting-on of the legs, and to the presence of the long pleural prolongations of the thoracic terga, a third sclerite, answering to the basal one in *Blatta*, is difficult of demonstration; but in *Lepisma*, a leg, when torn from its attachment, carries away with it three short joints, the basal one of which, as it lies *in situ*, is overlapped by the triangular part of the sternum. Some of the least modified of *Blattidae* have preserved almost perfectly the condition of things seen in *Lepisma*; but in the more modified forms, such as *Panesthia*, the basal sclerite of the legs is, as often happens in arthropods, immovably articulated, though not confounded, with the sides of the sternum, while the two distal sclerites are ankylosed together and show a tendency to become united to the coxa; the consequence is, that the leg bends at its base, not between the sternum and its true basal joint, but between this latter and the following joint. The appendage, then, in *Machilis* is articulated to the outside of the limb at the junction of the three-jointed basal with the five-jointed apical portion; it has, in fact, the same relation of position to it as has the precisely similar, and, as I believe, morphologically identical, *exopodite* to the five-jointed *endopodite* and to the *protopodite* in such a crustacean as *Penëus*; the only difference being that *Machilis* appears to have one more joint in its *protopodite*—a difference which may be accounted for on the supposition that *Machilis* is descended from some crustacean form\* in which a three-jointed *protopodite* is found.

“The basal segment [of the maxillary palpi] has a process regarded by Latreille as representing the cylindrical appendage of the posterior legs.”† I cannot, however, regard this as anything but a mere process of the basal joint; a comparison of the two posterior gnathites

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\* The *Phyllopoda*, some of the existing members of which have a distinct head like the insects and myriopods.

† Lubbock, ‘Monograph of the Collembola and Thysanura,’ 1873, p. 202.



and of the thoracic sternum and its appendages of *Machilis* with those of *Blatta* and *Lepisma* appears to me rather in favour of the view that the thoracic exopodites of the former, if represented at all in its maxillæ, are represented by the whole palp in both pairs, and that the outer of the three lobes into which the less modified second pair is on each side divided perhaps answers to a thoracic leg, while the middle and inner ones are processes of the two terminal joints of the protopodite, the first joint\* of this having coalesced with its fellow of the opposite side to form the great azygous basal plate, the 'submentum' of *Blatta*.

The presence of a similar appendage on the inner, instead of the outer, side of the very base of the first free joint † of all the legs except, according to Lubbock, the first pair in the myriopod genus *Scolopendrella*, ‡ suggests the suspicion that the limbs of myriopods are not strictly homologous with those of insects, but that they correspond with the rudimentary appendages of *Machilis*, and are consequently exopodites, the appendages of the legs in

\* The following pair or pairs of sclerites have not coalesced to form a 'mentum' as in *Blatta*, the two inner lobes of the jaw of which have been lost in the greater coalescence of parts that has taken place therein, the outer one alone remaining as the paraglossæ.

† This is here the fifth from the distal end of the limb. Two short joints, represented in this small and excessively-fragile creature by two scarcely perceptible folds, seem to be interposed, as in *Scolopendra*, between this first free basal joint and the sternum, and the appendage springs from the notch between the two folds and the first free basal joint of the limb. *Scolopendrella* differs from all myriopods known to me, and agrees with *Peripatus* and all insects in having legs terminated by two curved claws. In many of the legs of my specimens of *Peripatus* (*P. Moseleyi*, with 21–22 pairs of walking-legs, from S. Africa), I find, between the first joint and the foot-cones, on the under or inner side, a wart larger than the rest and terminating in a smooth and very low papilla, distinctly marked off from the wart by a circular groove. It occupies the same position relatively to the leg, and may represent the endopodite of *Scolopendrella*. *Scolopendrella* has very remarkable antennæ; they may be compared each to a series of glass cups strung upon a delicate hyaline and extensible rod of uniform thickness throughout; so that, like the body of the creature, they shrink enormously when the animal is irritated or thrown into alcohol, and they then possess scarcely two-thirds the length they have in the fully-extended condition, their cup-like joints being drawn close together, one within the other. *Peripatus*, *Iapyx*, many (if not all) Homoptera, and the S. Asiatic relatives of our common *Glomeris* have all more or less extensible antennæ.

‡ This curious myriopod is common all over Painswick Hill, Gloucestershire, where it lives beneath stones which have long lain, as their weathered or lichen-covered tops testify, deeply buried in the turf. The rarer and still more fragile *Campodea* lives in similar situations. I obtained all my specimens of both genera in the mouths of April and May.

*Scolopendrella* representing the legs of insects, which would appear to be endopodites.\*

The appendages of the legs, both in *Machilis* and *Scolopendrella*, appear to be quite immovable, and I feel sure that they are nothing but functionless rudiments. Those of the abdomen, in *Machilis*, on the contrary, are movably attached; the last and longest pair of them is invariably used in ordinary locomotion, and it is by their aid, at all events, that the sudden and powerful forward leaps † which the creature executes on being touched are effected; the rest, though they frequently move forwards and backwards with the hindermost pair, only succeed in planting themselves upon such projections of the surface over which the insect is passing as happen at the commencement of the strokes to come within reach of their shorter length. In their position of rest in the living insect they all slope downwards and backwards; but when a stroke is to be made they must be brought from this position to one in which they slope in the opposite direction, that is to say, forwards.

These appendages are commonly said to be attached to the posterior margin of the sternum, but a comparison of the sternum and appendages of the second abdominal somite with those of the metathorax shows that this is not the case. In *Machilis*, or, better, on account of its larger size, in such a cockroach as *Panesthia javanica*, the metathoracic sternum is made up of a short and soft anterior portion covered by the preceding somite, and of a hard and triangular posterior portion, to each side of which are articulated the two short basal joints that carry the five-jointed limb. Let us suppose the two limbs to be altogether aborted, rudimentary exopodites to be added in their proper place, and the two basal joints to be indistinguishably fused together, but to remain limited off from the sternum by a distinct suture and divided from their

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\* It should not be forgotten that, in the Mysis-stage of some prawns, it is the endopodite, and not the exopodite, of the thoracic members which is small and simple:—"Die fünf neuen Fusspaare sind zweiästig, *der innere Ast kurz, einfach,—der äussere länger, um ende geringelt*"—Fritz Müller, 'Für Darwin,' S. 41, fig. 31. If such a long exopodite were to grow up into a five-jointed ambulatory limb, the simple endopodite persisting, we should have precisely the condition of things we see in *Scolopendrella*.

† Supposing that all animals which now fly are descended from ancestors that jumped, it is interesting to find this wonderful saltatorial ability and the beginnings of wings in the Crustacean-like pleural prolongations of the thoracic terga of these 'Urinsekten.'

coalesced fellows of the opposite side by a fissure extending to the apex of the triangular sternum; finally, suppose the integument of the limb-bases internally to the exopodites to be pierced by apertures leading into glandular pouches; and we shall have arrived at an understanding of the structure of the second abdominal sternum (fig. 3) in *Machilis*; the second abdominal somite, in fact, closely resembles the metathorax deprived of its five-jointed limbs. The abdominal appendages of *Machilis*, therefore, are not articulated to the sternum but to a sclerite, which represents the basal joints of a thoracic limb—to a protopodite, in fact. In the somites anterior to the eighth the endopodites appear to be entirely absent, but in the eighth and ninth of the female they are represented by the long, jointed styles, two to each somite, constituting the four elements of the ovipositor (figs. 6 and 8).

In *Lepisma*, the appendages of the abdominal somites anterior to the eighth are represented, as Lubbock correctly considers, by a group of stiff yellow setæ; internally to these, on each side, is, according to the same author, “a second similar group nearer the median line, which appears to represent a second process, formed by a prolongation of the ventral margin of the penultimate segment.” It is clear that each of these more mesial pairs of fringes are the remains, not of the prolongations referred to, but of a pair of such rudimentary movable endopodites as I find, in the male, attached to the upper (dorsal) side, close to the inner margin of the prolonged protopodite (fig. 5) at about the same level as the longer and indistinctly-segmented exopodites. These rudimentary endopodites are clearly homologous with the posterior elements of the ovipositor in *Machilis* and *Lepisma*.

5§. When specimens of *Machilis maritima* are plunged into alcohol a single or a double pair of oval and pedunculated bladder-like bodies is protruded, apparently, from the posterior edge of the sternum, but, in reality, from the apex of the coalesced basal joints of the limbs (immediately internally to the rudimentary exopodites, where such are present) of each of the abdominal somites from the first to the seventh, both inclusive. When first thrust out they are as bright and, to the naked eye, as clear as little globules of Canada-balsam, but they rapidly become clouded and eventually opaque-white under the action of the alcohol. The bladders are everted glandular pouches, each provided with a powerful retractor muscle, divided

at its distal extremity into at least four branches, which traverse the glandular tissue and are inserted into the inner surface of the thin, smooth, and delicate epithelial membrane constituting the wall of the protruded bladders. Whether the bottom of the hilus-like depression seen at the extremity of each of them is prolonged into a tube opening into, or ending blindly in, the body-cavity, I have not yet been able to make out, but when the bladders are drawn in their external surfaces become the walls of glandular pouches, each opening to the exterior by a pore, which is defended by a chitinous operculum fringed with setæ on its free margin.

Fig. 3.

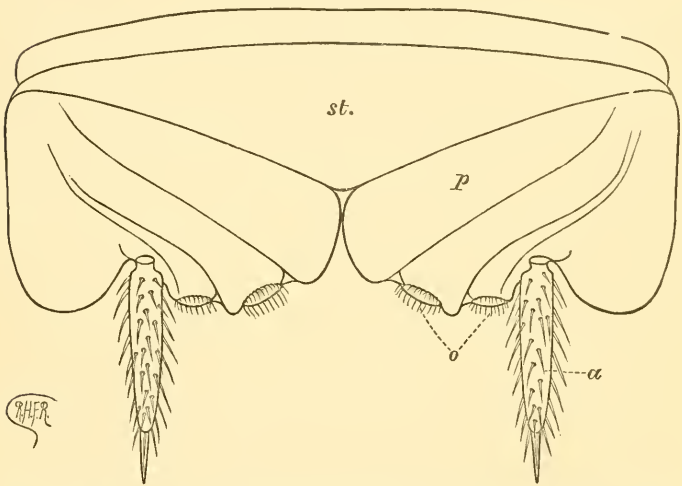


Fig. 3. *Machilis maritima*; sternum with appendages of 2nd abdominal somite; *st.*, sternum; *p.*, the coalesced basal joints of the right member; *o.*, the fringed opercula covering the external apertures of glandular pouches supposed to be homologous with the nephridia, renal pouches, or segmental organs of worms; *a.*, the exopodite, or outer branch of the member. This sternum only differs from a thoracic sternum in the absence of ambulatory legs (endopodites), and in the presence of glandular pouches.

The second to the fifth somites are each provided with four such pouches, viz., two opening close together near and internally to each exopodite; but the sixth and seventh, as also the first, which has lost its exopodites, have only a single pair.

In an inland species with short antennæ (apparently *Machilis (Forbicina) polypoda*) which I have found in considerable numbers on Painswick Hill, Gloucestershire, there is but a single pair of these pouches to each of the somites that in the littoral species has two.

These structures were first observed by Guérin,\* who apparently only knew them in their everted condition in alcoholic specimens, and who, from their somewhat similar form and position, not unnaturally regarded them as branchiæ, analogous to those of Isopod Crustacea. Burmeister † objects to this interpretation, and considers that they must have some other signification, internal breathing organs — namely, tracheæ — being already present.

In *Nicoletia*, the abdominal exopodites are said by Nicolet to be “accompagnées chacune au côté interne d’un petit corps vesiculeux et ovale faisant probablement partie des organes de la respiration.” ‡ These are, doubtless, identical with the structures observed by Guérin and myself in *Machilis*.

*Campodea* § has five or six pairs of relatively larger glandular pouches.

I am inclined to look upon these pouches as renal || or segmental organs, especially as I have observed, on the ventral or inner surface of all the conical foot-protuberances of *Peripatus*, in a position therefore answering as nearly as possible to that of the openings in *Machilis*, a slit-like pore, with swollen and slightly-everted mouth, leading, no doubt, into the segmental organs ¶ discovered by Hutton,\*\* and traced by him into the legs.

The recently-everted pouch in *Machilis* is covered with

\* Ann. d. Sc. Nat. 1836, p. 374.

† Handb. d. Entom., Bd. ii. 1839, p. 455.

‡ Lubbock, ‘Monograph of Collembola and Thysanura.’

§ Already observed by Meinert (Ann. Mag. Nat. Hist. 1867, ser. 3, vol. xx. p. 375).

|| It is a significant fact that no Malpighian vessels have yet been detected in any Thysanuran except *Lepisma*, in which these glandular pouches appear to be entirely absent; Meinert says, “I have failed to discover Malpighian vessels, nor do I think they exist either in *Iapyx* or in other Thysanura.”

¶ The aperture of the apparently homologous slime-glands, in the embryo of *P. capensis*, occupy the same position (*teste* Moseley in Phil. Trans.).

\*\* Ann. Mag. Nat. Hist. [Two papers on *Peripatus*, by Mr. Hutton, are contained in Ann. Mag. Nat. Hist. XVIII. pp. 361—369, and XX. pp. 81—83.—Ed.]

a film of liquid, the secretion of the gland, its microscopic appearance being precisely that of an object examined under the microscope before the spirit from which it has been taken has had time to evaporate from its surface, and a minute drop of fluid being left upon a piece of glass applied to it. In the worms the secretion of the segmental organs is carried out of the body by currents created by the cilia with which the walls of the excretory canals are clothed, but in *Machilis*, and probably in *Peripatus* also, by the eversion of the pouches, no arthropod possessing cilia on any part of the body at any period of its existence.

In the first abdominal somite the apertures of the glands are placed much nearer to the middle line than elsewhere, and it is clear that the ventral tube or sucker of the Collembola (which bear much the same relation to the Thysanura as the Brachyura do to the Macrura amongst Crustacea, or as spiders to scorpions amongst Arachnida) has resulted from the coalescence, or rather the partial coalescence, of this pair of glands, for it everywhere exhibits traces of having once been a paired organ:—"In *Podura*, *Lipura* and the allied genera, this organ is," according to Lubbock,\* "a simple tubercle, divided into two halves by a central slit; in other genera, as, for instance, in *Orchesella* and *Tomocerus*, the tubercle is enlarged and becomes a tube, divided at the free end into two lobes. In the *Smythuridæ* and *Papiriidæ* the organ receives a still further and very remarkable development; from the end of the tube the animal can project two long delicate tubes, provided at their extremity with numerous glands." Similarly, the first maxillæ in myriopods, and the second in insects, have coalesced to form a labium, different pairs of abdominal appendages, the springing apparatus of the *Collembola*, the originally paired sexual apertures, the single aperture of all insects,† &c.

The glandular pouches are absent from the two genital somites in *Machilis*, having possibly united to form the apertures and ducts of the genital and accessory genital

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\* Lubbock, 'Monograph of the Collembola and Thysanura,' p. 68.

† It is interesting to find in the lowest insects (Thysanura) traces of the former duplicity of the sexual aperture. Meinert says of *Iapyx*,—"The sexual orifice rests on the posterior margin of the ventral shield of the eighth ring, and the *deeply bifid* vagina of the female can be protruded from the latter;" and of *Campodea*,—"The sexual orifice is behind the eighth ventral shield, in a conical protuberance, which is simple in the male, but in the female *almost bifid*." *Iapyx* and *Campodea* are in this respect intermediate between the rest of the insects and the myriopods.

glands; however this may be, the remarkable difference in the position of the genital openings exhibited by the different groups and, very generally, by the opposite sexes of Arthropoda is intelligible on the hypothesis that all the members of the sub-kingdom have descended from some worm-like creature, provided in every somite of its body with a pair of segmental organs or nephridia, and that different pairs of these organs have, in different descendants of this hypothetical ancestor, been converted into the genital aperture and ducts.

6§. The gonapophyses of female *Blattidæ* are homologous, part for part, with the appendages of the eighth and ninth abdominal somites in the female of *Machilis*. No one has, so far as I know, ever suggested that the exarticulate setose styles (fig. 4) movably attached to the hinder extremity of the ninth abdominal sternum in the males of most *Blattidæ* are homologous with the abdominal appendages of the Thysanura, and yet the resemblance between the two is very striking; nor have any representatives of them yet been discovered in the females. Some months ago, while dissecting a species of *Blattidæ*, I detected at the extremities of the outer branches of the posterior bifid pair of appendages beneath the skin that was about to be cast, a small bud, with the skin that had shrunk away from it drawn out into a shrivelled and curled filament, and I dissected specimen after specimen of the same species, until I found the fully-evolved appendages shown in fig. 9, *a*. The appendages are reduced to mere rudiments in the eighth somite. (Fig. 7, *a*.) For further information see the rather full explanations of the accompanying woodcuts.

Fig. 4.

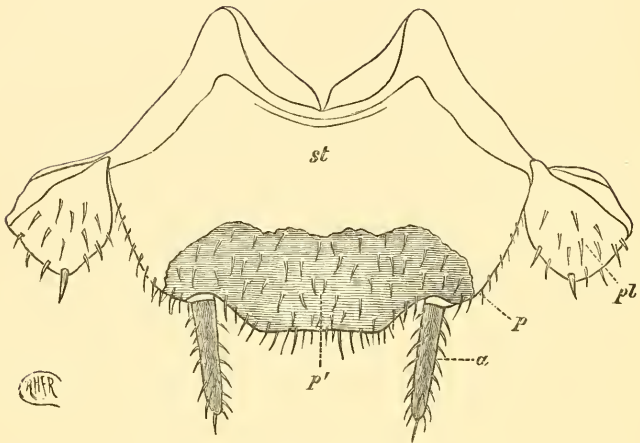


Fig. 4. '*Blatta*,' sp. The ninth sternum of the male : *st*, the sternum, which is colourless, or nearly so, and, when *in situ*, covered by that of the preceding somite ; the coloured and setose portion posterior to it represents the bases (protopodites) of the members which have coalesced with the sternum and with one another at *p'* in the middle line, where a narrow streak of lighter coloration than the surrounding chitine marks the junction ; *a*, the exopodites ; the endopodites (*b* in fig. 5) have been lost in the coalescence of the basal joints of the members with one another ; *p'l*, lateral sclerites apparently homologous with those which carry the spiracles in the spiraculiferous somites of the body.



Fig. 5.

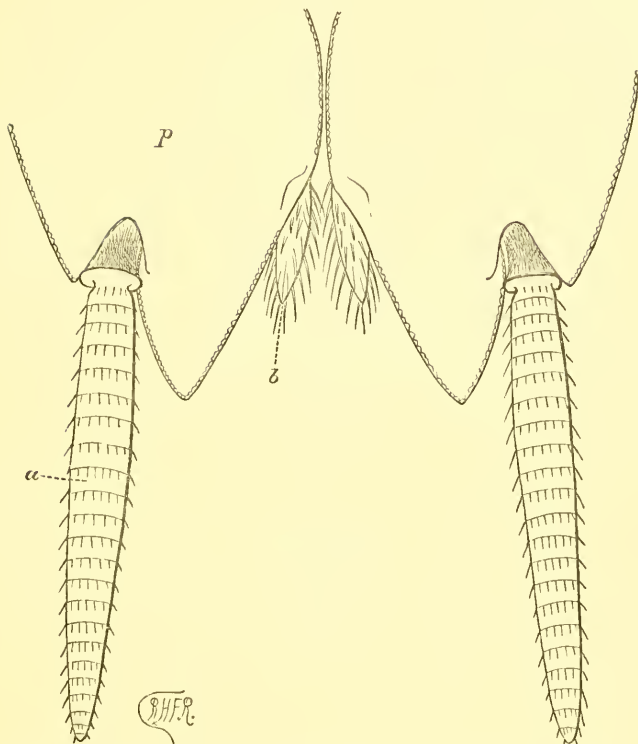


Fig. 5. *Lepisma*, sp. The appendages of the ninth abdominal somite in the male: *p*, the coalesced basal joints (protopodite) of one side carrying two branches, *a*, the exopodite, and *b*, the unmodified endopodites, which, with its fellow, answers to the posterior elements of the ovipositor in the female, but which is lost in the same segment in male *Blattidæ* in the coalescence of the two protopodites with one another and with the sternum (fig. 4); these endopodites are unquestionably represented in the preceding somite by a pair of whisks of long setæ, which whisks homologize with the more mesial of the two pairs of fringes of stiff yellow setæ in the somites anterior to the eighth, from which we may confidently infer that the ancestors of *Lepisma* possessed two-branched appendages, like those of the ninth, to all the somites of their abdomen.

The sternum and the basal parts of the protopodites are not shown in the figure.

Fig. 6.

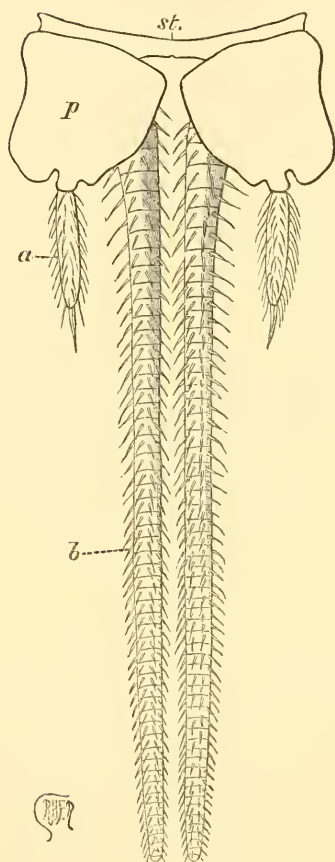


Fig. 6. *Machilis maritima*, ♀. The sternum with appendages of the eighth abdominal somite: *st.*, sternum; *p*, the coalesced basal joints (protopodite) of the limb of one side supporting two branches, *a*, the exopodite, and *b*, the endopodite, here modified so as to form one of the four elements of the tubular ovipositor. The inner margins of the enlarged and produced exopoditic portions of the protopodites are represented as diverging from one another more than they do in the living insect to permit of the mode of insertion of the endopodites being seen.

Fig. 7.

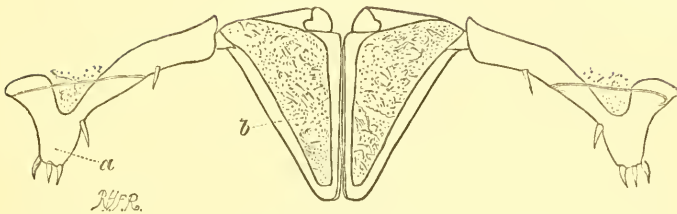


Fig. 7. '*Blatta*,' sp. Appendages of the eighth sternum or anterior gonapophyses, in a specimen of the apterous female which appears to have undergone the last ecdysis. No part of the sternum (*st*) is shown in the figure; *b*, the setulose endopodites (knife-blade-like processes of Prof. Huxley), answering to the two long, many-jointed, and setulose styles forming the anterior elements of the ovipositor (*b*, *b*) in *Machilis*; in an earlier stage than that here figured they are distinctly two-jointed; they are articulated, not to the sternum, but to the inner ends of two pieces (the protopodites) which are attached to the sternum and are all but confounded with it; externally to the endopodites two short and depressed teat-shaped and sparsely setulose appendages, which evidently homologize with the exopodites of *Machilis*, and the discovery of which, and of their homologues in the succeeding somite, establishes the perfect morphological identity of the gonapophyses of female *Blattidæ* with the ovipositor of *Machilis* and of *Lepisma*, are attached to the posterior margins of the same two pieces, from which they are marked off by a faint circumferential inflection of the integument. In the earlier stage above referred to, the endopodites at their bases as distinctly curve inwards and backwards as the homologous parts in *Machilis* are seen to do in fig. 6. The dotting is intended to represent the epidermis and subjacent tissues, which have contracted in the spirit and shrunk away from the chitinous cuticle.

Fig. 8.

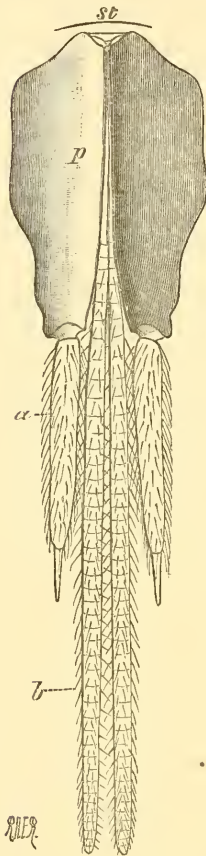


Fig. 8. *Machilis maritima*. The sternum with appendages of the ninth abdominal somite in the female: *st*, sternum; *p*, the coalesced basal joints (protopodite) of one of the limbs, supporting, as in the preceding somite, two branches, *a*, the exopodite, and *b*, the endopodite, modified so as to form the long, jointed, and setulose posterior elements of the ovipositor and articulated to the base of the protopodite on the upper (dorsal) side of this, which is produced into a large operculiform plate that meets its fellow in a straight suture in the middle line and carries at its extremity an exopodite. In female *Blattidae*, the great boat-shaped seventh sternum does duty for the operculiform productions of the exopoditic portions of the protopodites of both the genital somites in *Machilis*.

Fig. 9.

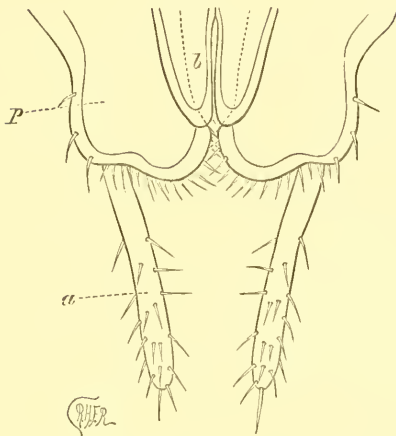


Fig. 9. '*Blatta*,' sp. Appendages of the ninth abdominal somite, or posterior gonapophyses, of the female, drawn from the same specimen as fig. 7, and viewed from the dorsal or upper side, so as to show the triangular endopodites (*b*) answering to the posterior elements of the ovipositor in *Machilis* and *Lepisma*; *a*, the exopodites, which are as firmly chitinized and as deeply coloured as, but relatively even larger than, the obviously homologous 'styles' of many male *Blattidæ* (fig. 4, representing the sternum, with appendages of the ninth abdominal sternum in the male of the same or an allied species); *p*, the coalesced basal joints (protopodite) of the biramous limb of one side: the part of this that carries the exopodite is produced much as in *Machilis* (fig. 8), but instead of meeting its fellow of the opposite side in the middle line, so as to conceal from their origin the endopodites that are attached to its own and to its fellow's base, meets its fellow only at the inner extremity, where it is expanded and strongly spined, so as to resemble, and, perhaps, to serve as, a forceps; the dotted lines represent the inner margins of these produced exopoditic portions of the protopodites as seen from the ventral or under side, in which view the endopodites can only be seen meeting in a straight median suture in the triangular hiatus bounded by the margins here shown in dotted outline.

In a much earlier stage than the one here depicted, the exopodites are represented by minute buds only, which increase with each successive ecdysis. In many *Blattidæ* which are much more modified than this, as, for instance, in *Panesthia Javanica*, no vestiges of exopodites appear to be present in either sex, at any stage, on either the eighth or the ninth abdominal sternum.

The sternum is not shown in this figure.



XI. *Description of a new Goliath beetle from Tropical West Africa.* By D. GREIG RUTHERFORD, F.L.S.

[Read October 2nd, 1878.]

(Pl. I.)

*Ceratorrhina Batesii.*

Oblongo-quadrata, nigra velutina; elytris utrinque guttis septem albis.

Long. 32 mill., lat. 15 mill.

♂. *Head* quadrate, crown deeply hollowed, sides sinuate; clypeus acutely produced at the lateral angles, and with a small recurved bifurcated horn in the middle; very finely punctured and covered with small tufts of black hair.

*Thorax* with the sides dark brown, covered with a fine velvety pile, very closely punctured with minute depressions; sides strongly produced in the middle and abruptly sinuated immediately behind the prominence.

*Elytra* more densely clothed with velvety-purplish pile, each elytron with two smooth carinæ, the outer one sinking into a large depression towards the base, the inner one parallel with the suture; seven ovate, more or less rounded tawny-white spots on each elytron, placed one in the middle towards the base, three in a line near the lateral margin, and three also in a line and nearly parallel to the suture.

*Beneath*, brownish-black, smooth, shining, mesosternal process densely, and abdomen sparsely, punctured. Head, sternum, interior of abdominal channel and anal segment, reddish-brown, edged with fine black pubescent fringe; legs black, smooth, sparsely punctured, coxæ and extremities of tibiæ reddish-brown.

Described from one specimen taken on Mount Camarons by the Rev. Q. W. Thomson, at an elevation of about 3,000 feet.

In Mus. F. J. Horniman.

I can find no species bearing any affinity to this remarkable *Goliathide*, with the solitary exception of *C. Sayi*, Westw., with which it seems to be related chiefly through the conformation of the head and the carinated structure of the elytra, a character somewhat rare in this genus. The quadrate form of the body, however, and the spotted elytra, separate it very widely from *C. Sayi*.

[*Note*, by H. W. BATES.—Mr. Rutherford having left England for West Africa before the above description was printed, and therefore without having an opportunity of supplementing it, I venture to do this for him, having been entrusted by Mr. Horniman with the type and also a specimen of the ♀, received afterwards from the same locality, for examination. 1. The ♂ specimen appears to me imperfect with regard to the armature of the back part of the crown, where in *C. Sayi* there is a quadrangular, nearly horizontal plate, dentiform at its anterior angles. In *C. Batesii* the whole upper surface of the head is deeply concave, but the hind part of the crown (which limits the concavity) shows a fracture in its middle, making it probable that there should be a horn or spine here, similar in position to that of *C. Niveus*. 2. The affinity with *C. Sayi* relates only to the shape of the forked horn and the produced incurved angles of the clypeus, to the short sternal process, and the spined outer edge of the four hind tibiæ in the ♂. In most other essential points of structure the two insects are very different. The chief points are the remarkably short and simple anterior tibiæ in the ♂, which resemble those of *C. aurata* and *quadrimaculata*, but are still shorter and more dilated, owing to the much-compressed ridge along their outer edge. In *C. Sayi* the tibiæ are elongate, slender, and trispinose on their outer edge. The black velvety pile of *C. Batesii* is composed of conspicuous but short black hairs, quite different from the compact silkiness which appears like part of the integument in *C. Sayi* and *Passerinii*. 3. This combination of peculiarities renders it impossible to locate the new species in any of the subgenera that have been proposed for the *Ceratorrhina*. 4. The ♀ has remarkably short and stout anterior legs, the tibiæ being broad, and armed with three short and broad teeth on their outer edge. The clypeus is much shorter and more rounded than in the ♀ of any other *Ceratorrhina*, and its lateral and front edges are uniformly and strongly elevated, rendering the surface concave. The spines on the outer edge of the four hind tibiæ are replaced by strong and broad triangular teeth.]

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 PLATE I.

1. *Ceratorrhina Hornimani*, ♂.  
Trans. Ent. Soc. 1877, p. 202.
2. *C. Batesii*, ♂.
3. *C. 4-maculata*, Oliv. ♂.  
Trans. Ent. Soc. 1877, p. 201.



XII. *An attempt to point out the differential characters of some closely-allied species of Chrysomela, principally those contained in Suffrian's 11th group; also descriptions of some hitherto uncharacterized forms belonging to the same and other genera of the family.* By JOSEPH S. BALY, F.L.S.

[Read June 4th, 1879.]

(Pl. II.)

MY principal object in bringing the present paper under the notice of the Society is to point out that *Chrysomela speciosa* and its closely-allied forms, belonging to the 11th group of Suffrian's monograph, possess good structural characters, by the aid of which they may be readily separated into their respective species. Hitherto, owing to their great similarity in form, sculpture, pattern and coloration,\* these insects have been a constant source of perplexity to the student, and are mixed up in our collections in apparently hopeless confusion.

Since the promulgation of the Darwinian theory, the ideas of most naturalists on the limits of a species have been greatly enlarged, whilst their views as to its proper definition have been much modified; the conviction is now almost universal, that in the diagnosis of an animal, structural differences (as far as practicable) should be insisted upon, to the comparative exclusion, beyond certain limits, of the minor points of pattern, colour and similar characters, formerly so constantly employed for the purpose.

Most animals, placed under favourable conditions of life, viz., abundant food, genial climacteric influences, the absence of enemies and the like, increase rapidly, and, unchecked by natural obstacles, spread quickly over a very wide area. Should these conditions be highly favourable

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\* In the group before us the individuals of a species not only vary in these respects amongst themselves, but the same colours and pattern are repeated in several closely-allied forms, so that, without strict attention to structural differences, it is quite impossible to separate them.

and in excess of the requirements of the species, the superabundant vital force thus acquired would seem to expend itself in throwing off innumerable varieties, some so dissimilar in habit to the parent form as to be considered by many naturalists specifically distinct.

Slight alterations in the conditions; differences of climate, lessened food supply, the inroads of enemies, and other causes too numerous to mention, will check this exuberance of life, and some of the weaker varieties (unfitted to stand against these changes) will die out, whilst those which remain, in accommodating themselves to their new surroundings, will undergo further modification and eventually attain specific rank.

Not unfrequently the individuals adapt themselves so entirely to their new state of life that the requirements and means of existence are equally balanced; and the animals will then continue unchanged for an indefinite length of time, or so long as this balance remains undisturbed.

Lastly, the environment of a species is often so adverse to its wellbeing that it gradually succumbs, and, after a more or less prolonged struggle for existence, dwindles away, and finally dies out.

Every intermediate stage will, as a matter of course, be found between these extremes; but, assuming the doctrine of development to be true, it must be obvious that every animal must live under one or more of the above-named conditions, and it must be equally obvious that the immediate surroundings of an animal must determine its permanence as a species, its development into fresh forms, or its final extinction; the vital energy of an animal being governed by the favourable or unfavourable conditions, or, in other words, the local peculiarities of the spot in which it lives.

It must happen that a widely-spread species, stretched over an extended district, will be exposed to varying influences, some favourable, others adverse to its necessities or requirements of life, and it may be readily conceived that each individual, in accommodating itself to its immediate locality, will undergo various modifications, and depart more or less from the parent form. At one point such departure will be but slight, and not extend beyond the limits of a local variety or race; at another the divergence will be greater, and culminate in the development of structural characters, of sufficient importance

to separate the individual from the original type, and develop it into a distinct species; in a third, from adverse causes, the species may be on the eve of total extinction.

I have omitted all mention of sexual selection, which doubtless plays an important part in the gradual modification of animals, more especially in the development of sexual differences; but I have said enough to show that, in the minds of all who hold the above views, the conception of a species and of its limits must stand on a broader basis than the one entertained by the older naturalists.

Individuals will occasionally be met with (as, for example, in *Ch. sanguinolenta* and allied forms), so closely on the border-line between variety and species, and presenting such slight differences of structure, that they may be placed, with almost equal justice, under either head; with these exceptions, the absence of structural characters will reduce an individual, differing only in minor particulars, to the subordinate rank of a variety (local or otherwise) of a previously-known specific group.

In the vertebratæ and higher animals good characters are often found both in the skeleton and in the soft internal organs; in the invertebratæ and lower forms of life, the softer parts are generally unavailable for use, and characters must be sought in the outer surface of the body.

In insects the part of the body where these characters reside vary in almost every family. In the *Chrysomelidæ* they are found in the tarsi, the palpi, the margination and shape of the sides of the thorax, in the arrangement of the punctuation of the elytra, in the apical segment of the abdomen, and more rarely in the antennæ; lastly, the telum or ♂ organ\* (in many groups quite useless as a

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\* The *telum* or ♂ organ may be separated into the following parts:—(1) the *body*, a hollow corneous tube, variable in length, and more or less curved longitudinally, the convexity of the curve being upwards; its lower surface is prolonged anteriorly into (2) the *apex*, the variations in form of which afford valuable diagnostic characters; its upper or convex surface is shorter than the lower and terminates anteriorly in (3) the *valve*, a corneous or semi-corneous plate, continuous at its base with the surface of the body, but free at the sides and apex; when sufficiently rigid to retain its shape after death, it is frequently of use in separating closely-allied species; lastly (4), the *duct*, a slender, apparently tubular body, lying in the cavity of the telum; this last is often short and entirely hidden from view, but frequently extends beyond the anterior margin of the valve or even beyond the apex of the telum itself; it is sometimes slender and filiform, at other times more robust and rigid; its apex is very variable in form.

In medium sized or large Coleoptera the telum can always be extracted without the slightest injury to the specimen; the mode I adopt is as

means of diagnosis) varies greatly in form in the present family, and often affords most important aid in the separation of allied species. I will only add, that I have included in this paper the descriptions of some *Chrysomelidæ* contained in my cabinet, apparently new to science.

SYNOPTICAL TABLE of the Species belonging to Suffrian's 11th group, described or mentioned in this paper.

I. Apical joint of maxillary palpus broadly truncate.

A. Sublateral groove of thorax interrupted in its middle third.

- a. Elytra oblong or oblong-ovate; sides parallel in the ♂, usually dilated posteriorly in the ♀.

MALES.

1. Apex of anal segment of abdomen trilobate, the lobes obtuse, equal in length *speciosa.*
2. Apex of anal segment concave-emarginate, bisinuate, the intermediate lobe shorter than the angles of the emargination,—
  - \* Apical joint of maxillary palpus broader than the penultimate .. *nivalis.*
  - \*\* Apical joint of maxillary palpus narrower than the penultimate.. *gloriosa.*
3. Apex of anal segment bisinuate, the intermediate lobe produced, angulate.. *bifrons.*

FEMALES.

1. Apex of anal segment of abdomen bisinuate, trilobate, the intermediate lobe scarcely longer than the lateral ones, obtuse .. .. . *speciosa.*
  2. Apex of anal segment bisinuate, trilobate, the lateral lobes very short, the medial one produced, subangulate .. *gloriosa.*
  3. Apex of anal segment obtusely rounded, obsoletely bisinuate .. .. . *nivalis.*
  4. Apex of anal segment angulate .. *bifrons.*
- b. Elytra regularly oval, not dilated behind the middle in either sex .. .. . *sulcata.*
- B. Sublateral groove of thorax entire .. .. *intricata.*

follows:—After the removal of the abdomen from the body, which I readily effect by the insertion of a needle into the hinder acetabula (between the coxæ and the basal margin of the abdomen), I moisten its under surface with a little water or spirit, and extract the telum with a fine pair of forceps; having done so, I mount the latter on a strip of card, and, with the aid of gum, refix the former in its original position.

- II. Apical joint of maxillary palpus obtusely truncate or obtuse.
- A. Sublateral groove of thorax obsolete, or nearly so *alecyonea*.
- B. Sublateral groove of thorax distinct, entire.
- \* Body narrowly elongate, sides of elytra parallel, or nearly so, in either sex .. .. . *cacaliæ*.
- \*\* Body elongate, dilated posteriorly in both sexes .. .. . *elongata*.
- \*\*\* Body elongate, oblong-elongate or oblong-ovate; sides of elytra subparallel or parallel in the ♂, usually dilated posteriorly in the ♀.
- o. Body exceeding 4 lines in length .. .. . *tristis*.
- oo. Body not exceeding 4 lines in length.

## MALES.

- † Anal segment of abdomen truncate, apex of telum hastate .. .. . *elegans*.
- †† Anal segment truncate, obsolete bispinnate; apex of telum angulate, its extreme apex produced, subcuneiform. *speciosissima*.

## FEMALES.

- † Elytra ovate, distinctly dilated posteriorly *speciosissima*.
- †† Elytra broadly oblong-ovate, scarcely dilated behind the middle .. .. . *elegans*.

*Chrysomela speciosa*, Fabr.

Syst. Ent. i. p. 101; Suffr. Mon. p. 172.

Elongata ♂; minus elongata et postice paullo ampliata ♀; thorace evidenter, minus crebre punctato, lateribus intra marginem longitudinaliter excavatis, sulco rude et fortiter foveolato-punctato, basi magis fortiter excavato, medio interrupto; elytris sat crebre aciculato-punctatis, interspatiis rugulosis.

*Mas.*—Tarsorum anticorum quatuor articulo basali dilatato, semi-ovato, illo tarsi postici longiori, semi-elongato-ovato; abdominis segmento apice trilobato, lobis æquilongis; *telo* elongato, curvato, lateribus apicem versus paullo attenuatis, apice dilatato, subspathulato, apice ipso abrupte deflexo; valvulâ rigidâ, recurvatâ.

*Fæm.*—Abdominis segmento anali apice obtuse angulato, utrinque leviter sinuato.

A. Læte metallico-viridis, elytris vittis duabus, basi et apice confluentibus, unâ subsuturali, unâ submarginali, rufo-aureis aut aureis.

- B. Metallico-viridis, cæruleo tineta, elytrorum vittis aeneis.
- C. Metallico-viridis, elytrorum vittis nigro-cyaneis.  
*Ch. phalerata*, Germ. Faun. Eur. 16, tab. 13.
- D. Cupreo-aut aureo-enea, viridi tineta, elytris rufo-aureis, lineâ angustâ suturali, limbo inflexo vittâque discoidali aeneis.  
*Ch. superba*, Oliv. Encycl. Meth. v. p. 705.
- E. Metallico-viridis, lineâ angustâ suturali, limbo inflexo vittâque discoidali metallico-cæruleis aut nigro-cæruleis.
- F. Cæruleo-nigra aut nigra.  
*Ch. venusta*, a, b, Suffr. p. 175.  
*Ch. nigrina*, a, b, Suffr. p. 176.
- G. Viridi-cyanea aut cyanea, elytrorum signaturis obsoletis.  
*Ch. punctatissima*, Suffr. p. 174.
- Long.  $3\frac{1}{2}$ —6 lin.  
*Hab.*—European Alps.

Thorax nearly twice as broad as long; sides nearly straight and parallel from the base to beyond the middle, thence rounded and converging to the apex; disk distinctly punctured, the lateral margin bounded within by a broad, coarsely and irregularly-punctured longitudinal space, the hinder third of which is deeply excavated; the middle third is on a level with the disk, and its anterior third, which is dilated inwardly on the disk, only slightly depressed. Elytra broader than the thorax, sub-elongate and nearly parallel in the ♂; more oblong and dilated posteriorly in the ♀; convex, strongly and rather closely aciculate-punctate; interspaces granulose, irregularly wrinkled, more strongly so on the outer disk and behind the middle.

*Ch. speciosa* is more widely spread and is more variable in size, colour and degree of punctuation than any other species in the sub-group to which it belongs.

It agrees with *gloriosa*, *bifrons*, *nivalis* and *sulcata*, in the broadly truncate apical joint of the maxillary palpus, and in having the lateral sulcation of the thorax more or less broadly interrupted in its middle third. Good differential characters exist some of which will be found in the table given above, and others will be pointed out in the descriptions of each species.

The apical joint of the maxillary palpus is equal in width, or nearly so, to that of the penultimate. It differs in this respect from *bifrons* and *nivalis*, in both which insects it is broader than the penultimate. The same character separates it from *gloriosa*, in which species the terminal joint is narrower than the preceding one. In the ♂ sex of *speciosa* and *gloriosa*, the basal joint of the two anterior pairs of tarsi agrees in length and dilatation; in both it is longer than in *nivalis*. The trilobate apex of the anal segment of the abdomen in the ♂ is very similar to that of *sulcata*, but the great difference in general form in the two species will prevent them from being confounded with each other, even when the longitudinal grooves on the elytra in the latter insect are wanting. The form of the apex of the segment in the ♀ approaches very closely to that of the *gloriosa*, but in the present insect the extreme apex or space between the sinuosities is very slightly produced and very obtuse.

*Chrysomela nivalis*, Suffr.

Lin. Ent. p. 16, var.  $\gamma$ - $\delta$ ; *ignita* Kuster. Kaf. 13, n. 90?

Elongata, fere parallela ♂; minus elongata, postice ampliata ♀, rufo-emprea, subtus aeneo tincta; thorace subcrebre punctato, lateribus intra marginem profundius punctatis, basi excavatis, apice leviter depressis; elytris thorace latioribus, parallelis ♂, postice ampliatis ♀, convexis; subopacis, minus fortiter punctatis, punctis aciculatis, interspatiis granulosis, leviter rugulosis.

*Mus.*—Palporum maxillarium articulo ultimo quam penultimo latiori, apice late truncato. *Tarsorum* omnium articulo basali dilatato, breviter semi-ovato, illo tarsi postici paullo longiori; *abdominis* segmento ultimo apice concavo-emarginato, fundo breviter lobato; *telo* modice elongato, curvato, apice semi-ovali.

*Fæm.*—*Abdominis* segmento ultimo obtuse rotundato, utrinque obsolete sinuato.

Long. 4—5 lin.

*Hab.*—Swiss Alps; Pyrenees.

Thorax nearly twice as broad as long; sides parallel at the base, rounded and converging from the middle to the apex; disk more closely punctured than in *Ch. speciosa*, the sides excavated in a similar manner, but more sparingly impressed with coarse punctures than in that species, the puncturing being finer and less separable from that of the

disk. Elytra broader than the thorax, the sides parallel in the ♂, dilated posteriorly in the ♀, convex, subnitidous or more rarely nitidous, finely but distinctly punctured, the punctures aciculate; interspaces granulose, finely and irregularly wrinkled. Thorax more closely punctured than in any of the other species of the subsection; the elytra more finely punctured, their general surface being at the same time less nitidous and more finely wrinkled.

All the specimens I have seen of this insect (some twenty in number) are extremely uniform in coloration; they are all a coppery-red, more or less tinged with æneous beneath; they belong to Suffrian's var.  $\gamma$  and  $\delta$ . I have never met with any of the other varieties given by Suffrian, and cannot help suspecting that they belong to some other species.

The short basal joint of the four anterior tarsi, together with the broader apical joint of the maxillary palpus, will separate the ♂ of *nivalis* from the same sex of *gloriosa*, the only one with which it might be confounded; the ♀ may be at once known by the obtusely rounded and obsoletely bisinuate apical segment of the abdomen.

*Chrysomela gloriosa*, Fabr.

Ent. Syst. i. p. 324; Syst. El. i. p. 440; Suffr. p. 165.

Elongata, postice vix ampliata, convexa; thorace utrinque intra marginem incrassatum profunde et irregulariter foveolato-punctato, basi profunde, apice minus evidenter excavato, disco suberebre punctato, baseos medio vittâ brevi impresso (hâc vittâ interdum obsoletâ); elytris sat fortiter punctatis, punctis aciculatis, interspatiis rugulosis.

*Mas.*—*Abdominis* apice late concavo-emarginato, fundo leviter bisinuato, medio breviter lobato, lobo obtuso; *telo* robusto, sat elongato, regulariter curvato, apice linguiformi.

*Fœm.*—*Abdominis* apice utrinque concavo-emarginato, apice ipso distincte producto, obtuse angulato.

- A. Viridi-metallica, thorace cyaneo tincto; elytrorum lineâ suturali vittâque discoidali utrinque abbreviatâ cyaneis.
- B. Cyanea, elytrorum lineâ suturali vittâque discoidali nigro-ceruleis aut ceruleis.
- C. Cyanea, elytrorum signaturis obsoletis.

Long. 4—5 lin.

*Hab.*—Swiss Alps.



Thorax similar in shape and punctuation to *Ch. speciosa*; middle disk sometimes impressed on the basal margin with a short longitudinal fovea (this fovea is ill-defined and often entirely obsolete). Elytra punctured as in the preceding species.

The ♂ may be known from the same sex of all the other species of the subsection (*nivalis* excepted) by the form of the anal segment; from the latter insect the narrow terminal joint of the maxillary palpæ, together with the longer basal joint of the four anterior tarsi, will separate it; the apex of the anal segment in the ♀ is nearest in shape to *speciosa*, but the medial lobe is produced and more distinctly angulate.

*Chrysomela bifrons*, Fabr.

Elongata ♂, oblongo-elongata, postice paullo ampliata ♀; thorace tenuiter sed distincte punctato, lateribus intra marginem rude foveolato-punctatis, basi et apice excavatis; elytris sat crebre, subfortiter punctatis, punctis aciculatis; interspatiis nitidis, leviter rugulosis; palporum maxillarium articulo ultimo quam penultimo latiori, late truncate.

*Mas.*—*Tarsorum* anticorum articulo basali semiovato; illis tarsorum posteriorum quatuor longioribus, semi-elongato-ovatis; *abdominis* segmento ultimo bisinuato, lobo intermedio paullo producto, angulato; *telo* sat elongato, curvato, apice non deflexo, lateribus parallelis, ad apicem oblique convergentibus, apice antrorsum prolongato, anguste cuneiformi, apice ipso obtuso.

*Fœm.*—*Abdominis* segmento ultimo subangulato, apice extremo obtuso.

A. Supra læte cuprea, subtus cyanea.

*Ch. bifrons*, Fabr. Ent. Syst. i. p. 314; Syst.

El. i. p. 432.

B. Viridi-ænea, subtus viridi-cyanea, thoracis basi elytrorumque suturâ vittâque discoidali cyaneis.

*Ch. vittigera*, Suffr. Mon. p. 166.

C. Viridi-metallica, æneo tineta.

*Ch. ænescens*, Suffr. (?) l. c. p. 161.

D. Metallico-purpurea.

*Ch. luctuosa*, var. (?)

Long. 4—5½ lines.

*Hab.*—Italian Alps, Pyrenees, A.; Swiss Alps, B., C. and D.

Thorax twice as broad as long; sides parallel at the base; thence rounded and converging to the apex; disk finely punctured, sides more deeply excavated at the base than in *Ch. speciosa*, coarsely punctured. Elytra broader than the thorax, parallel in the ♂, slightly dilated posteriorly in the ♀, rather strongly aciculate-punctate; interspaces nitidous, less strongly wrinkled than in allied species, basal joint of the anterior pair of tarsi in the ♂ semiovate, scarcely longer than broad, gradually increasing in length in the two hinder pairs, in the third twice as long as broad.

All the specimens agreeing in coloration with Suffrian's description (which is probably that of a local form) came from Italy; the other varieties of colour were brought from the Swiss Alps. I have received the species from Mäerke's collection under the names of *vittigera* and *pretiosa*, Suffr., and *luctuosa*, Duft.

In punctuation this insect more closely resembles *Ch. speciosa* than any of the other species of the subsection; both sexes may be at once separated by the peculiar form of the apex of the anal segment of the abdomen. In the larger females, the elytra are more parallel and less dilated posteriorly than in fully-developed specimens of *speciosa*, but this character in a long series of individuals would probably be found inconstant; from *nivalis*, with which it agrees in the broader apical joint of the maxillary palpus, the different relative length of the basal joint of the tarsi in the three pairs of legs will at once distinguish it.

*Chrysomela sulcata*, Gebl.

Mem. Mosc. vi. 1823, p. 123.

Anguste elongato-ovata, metallico-cærulea aut viridiana, thorace sat fortiter, suberebre punctato, lateribus incrassatis, sulco longitudinali intus marginatis, sulco medio interrupto, basi magis profunde excavato, rude foveolato-punctato; elytris ovatis, suberebre aciculato-punctatis, interspatiis rugulosis; utrisque sulcis latis longitudinalibus tribus, leviter excavatis, instructis.

Var. A. Elytrorum sulcis obsoletis.

*Ch. basilea*, Gebl. Mem. Mosc. vi. 1823, p. 122.

,, Germ. Ins. Spec. Nov. 1823, p. 594.

*Mas.*—*Tarsorum* anticorum quatuor articulo basali

dilatato, breviter semi-ovato, illo tarsi postici paullo longiori; *palporum* maxillarium articulo ultimo late truncato, quam penultimo latiori; *abdominis* segmento anali trilobato, lobis obtusis, fere æquilongis; *telo* elongato, curvato, apice linguiformi, apice ipso paullo deflexo; *ducto* quam *telo* breviori, dorso canaliculato, apice bifido.

*Fœm.*—*Palporum* maxillarium articulo ultimo ad penultimum æquilato aut vix latiori; *abdominis* segmento anali apice angulato-rotundato, integro.

Long. 4—5 lin.

*Hab.*—Eastern Siberia, Lake Baical; Mongolia.

Thorax nearly twice as broad as long; sides thickened, straight and nearly parallel from their base to beyond the middle, thence rounded and converging to the apex, the hinder angles acute, the anterior ones moderately produced, obtuse; disk rather strongly and somewhat closely punctured, a very narrow longitudinal line on the middle disk (sometimes obsolete) free from punctures; the longitudinal space bounding the thickened lateral margin deeply excavated from its base nearly to its middle, slightly excavated in front, less broadly interrupted in the middle than in *speciosa*; its whole surface much more coarsely and irregularly punctured than in its congeners. Elytra regularly oval, not dilated behind the middle, convex, aciculate-punctate; interspaces irregularly but less coarsely wrinkled than in *speciosa* and its allies; each elytron with three broad, shallow, ill-defined longitudinal sulcations, which extend nearly the whole length of the disk; in some specimens these grooves are much less distinctly marked, in others (*Ch. basilea*, Gebl.) they are entirely obsolete.

When these sulcations are present, they alone will separate the insect from its allies; when absent, the narrow elongate-ovate form of the body, and the regularly ovate elytra, not dilated posteriorly in either sex, will at once distinguish the species from all others of the same sub-group.

The apex of the anal segment of the abdomen in the ♂ is similar in shape to that of *speciosa*; in the ♀ it closely resembles *bifrons*, but is rather shorter and less distinctly angulate.

The two forms of the above insect stand in our cabinets under different names, given them in the same paper by

Gebler in 1823. They agree so closely in all essential characters, and the sulcations of the elytra are so variable in degree and definition, that without hesitation I have placed them under the same specific head.

The specimens of var. A. are usually rather smaller than those belonging to the typical form.

*Chrysomela intricata*, Germ.

Ins. Spec. Nov. 1824, p. 596; Suffr. Mon. p. 180.

Anguste oblonga ♂, oblongo-ovata postice paullo ampliata ♀, viridi-aut cæruleo-metallica; thorace transverso, rude rugoso-punctato, lateribus intra marginem longitudinaliter sulcatis; elytris subcrebre punctatis, interspatiis irregulariter rugosis.

*Mas.*—*Abdominis* segmento anali apice concavo-emarginato; *telo* brevi, robusto, curvato, apice obtuse angulato.

*Fœm.*—*Abdominis* segmento anali apice obtuse rotundato.

Long. 4—5½ lin.

*Hab.*—Swiss Alps; Styria.

The character given in the Synoptical Table so completely separates this species from its congeners that a detailed description is quite unnecessary.

*Chrysomela aleyonea*, Suffr.

Mon. p. 156.

*Ch. speciosa*, var. K. *aleyonea*, Kraatz. Berl. Ent. Zeit. 1859, p. 283.

Elongata, parallela ♂, thorace transverso; disco punctato, lateribus intus non aut vix excavatis, rude variolosis; elytris sat crebre aciculato-punctatis, interspatiis rugulosis; palporum maxillarium articulo ultimo ad penultimum latitudine vix æquali, breviter ovato, apice obtuso.

*Mas.*—*Tarsorum* articulo basali semiovato, duobus anticis fere æquilongis; tertio longiori; *abdominis* segmento anali apice concavo-emarginato; *telo* brevi, robusto, curvato, apice obtuso; *ducto* gracili, filiformi, quam *telo* longiori.

Viridi-metallica, fronte, thoracis lateribus, tibiis abdominisque segmentis apice aureis; elytris aureis, lincâ suturali

vittâque latâ discoidali cyaneis; limbo externo viridi-æneo.

Long.  $3\frac{2}{3}$  lin.

*Hab.*—South of France; Styria.

Thorax nearly twice as broad as long; sides straight and nearly parallel from the base to beyond the middle, thence obliquely converging and slightly rounded to the apex, the anterior angles acute, the anterior margin deeply concave-emarginate; disk distinctly punctured, the sides coarsely variolose, punctate, irregularly wrinkled. Elytra nitidous, rather strongly punctured; interspaces irregularly rugose.

This insect, considered by Dr. Kraatz and others as a small variety of *Ch. gloriosa* or *speciosa*, is nevertheless a good species. The male (the only sex known to me) is separated from *speciosa* by the much smaller size, the ovate apical joint of the maxillary palpus, by the absence (or nearly so) of the lateral excavations on the thorax, by the concave apex of the anal segment of the abdomen, and lastly, by the entirely different shape of the *telum*; in the present species this organ is very short, robust, regularly curved, obtuse at the apex, its slender and filiform duct extending considerably beyond the apex of the *telum* itself.

### *Chrysomela tristis*, Fabr.

Elongata fere parallela ♂; magis oblonga, postice paullo ampliata ♀; thorace tenuiter sed distincte punctato, lateribus rotundatis (basi parallelis ♂) intra marginem longitudinaliter sulcatis, sulco integro, rude foveolato-punctato; clytris sat crebre aciculato-punctatis, interspatiis rugulosis; palporum maxillarium articulo ultimo ad penultimum vix æquilato, apice obtuse truncato.

*Mas.*—*Tarsorum* anteriorum quatuor articulis basalibus, fere æquilongis, modice dilatatis, semiovatis. Tarsi postici articulo basali longiori; *abdominis* segmento ultimo obtuse truncato, bisinuato, apice vix producto; *telo* modice elongato, curvato, apice semiovato; ducto ad teli apicem æquilongo, apice paullo dilatato.

*Fœm.*—*Abdominis* segmento ultimo obtuse angulato, utrinque obsolete sinuato.

A. Viridi-metallica aut viridi-ænea.

B. Viridi-ænea, clytris cupreis.

C. Olivacea, viridi tineta.

D. Cyanea aut metallico-cærulea.

E. Cæruleo-nigra aut nigra.

*Ch. luctuosa*, Duft. (sec Suffrian).

Long.  $4\frac{1}{2}$ —5 lin.

*Hab.*—Swiss Alps, Dieppe, Turkey (Jelski).

Thorax nearly twice as broad as long; sides moderately rounded in the ♀, parallel behind the middle in the ♂, thickened, bounded within by a deep entire longitudinal groove, the surface of which is coarsely foveolate-punctate; disk finely but distinctly punctured. Elytra narrowly oblong in the ♂, broader and dilated posteriorly in the other sex; convex, rather closely impressed with aciculate punctures; interspaces rugulose.

All the specimens I have seen of this species—twenty-six in number—agree in having the coloration of the elytra of a uniform tint, all markings being obsolete. I have, therefore, excluded Suffrian's varieties a, b, c; a bluish-black specimen sent to me by Dr. Suffrian as *Ch. luctuosa*, Duft., belongs to the present species; another, metallic blue, from Mäerkel's collection, bearing the same name, is a variety of *Ch. bifrons*.

In addition to the structural characters, the larger more robust form in both sexes, together with the more oval shape of the elytra in the ♀ sex, will separate this insect from its allies in the same subsection.

### *Chrysomela cacaliae*, Schrank.

Suffr. Mon. p. 150.

*Ch. tussilaginis*, Suffr.?

Anguste elongata, thorace disco sat remote, irregulariter punctato, ad latera rude rugoso; lateribus incrassatis, intus longitudinaliter excavatis; elytris pallelis, minus nitidis, sat crebre punctatis, interspatiis aciculato-rugulosis; palporum maxillarium articulo ultimo quam penultimo angustiori, ovali.

*Mas.*—*Tarsorum* articulo basali modice dilatato, semiovato; duobus anticis fere æquilongis; tertio paullo longiori; *abdominis* segmento anali concavo-emarginato, bisinuato, lobo intermedio obtuse angulato; *telo* modice elongato, curvato, lateribus pallelis, apice oblique-convergentibus, apice ipso vix incurvato, sat valde producto, sublinguiformi.

*Fœm.*—*Abdominis* segmento anali apice bisinuato, lobo intermedio producto, angulato.

A. Viridi-metallica aut viridi-cyanea, thoracis basi elytrorumque lineâ suturali vittâque latâ vel plagâ subhumerali cœruleo-metallicis.

B. Tota cœruleo-metallica.

Long. 4—5 lin.

*Hab.*—European Alps.

Thorax half as broad again as long; sides parallel and slightly sinuate behind the middle, slightly dilated and rounded in front, the hinder angles very acute; disk rather strongly and irregularly, but not closely punctured; sides coarsely and more closely rugulose-punctate; lateral margin broad, thickened, impressed with a few coarse punctures, bounded within by a deep, entire, longitudinal coarsely-punctured groove. Elytra much broader than the thorax, parallel or nearly so in both sexes, less convex than in most of the other species, distinctly punctured, the interspaces aciculate, irregularly wrinkled.

This species is most nearly allied structurally to *Ch. speciosissima*; its larger size, narrower form, the parallel sides of the elytra in both sexes, together with the greater elongation of all its parts, more especially of the apical lobe of the *telum*, will separate it from that species.

*Ch. tussilaginis*, Suffr., is considered by Dr. Kraatz as a variety of this species. I have given the synonyms with doubt, as Suffrian says, "*hinten etwas erweitert*," but a specimen labelled *tussilaginis* from Mäerkel's collection is equally parallel with the typical form.

### *Chrysomela elongata*, Zeigl.

Suffr. Mon. p. 146.

*speciosissima*, var. Kraatz, Berl. Zeit. 1859, p. 286.

*Elongata*, postice in utroque sexu distincte ampliata, convexa, thorace fortiter irregulariter punctato, lateribus incrassatis, intus sulco longitudinali rude foveolato marginatis; clytris sat fortiter aciculato-punctatis, interspatiis leviter rugulosis; palporum maxillarium articulo ultimo quam penultimo angustiori, ovato, apice obtuso.

*Mas.*—*Tarsorum* articorum articulo basali modice dilatato, semiovato; illis *tarsorum* posteriorum longioribus, longitudine inter se fere æqualibus; *abdominis* segmento

anali late concavo-emarginato; *telo* modice elongato, valde curvato, apice vix recurvato, linguiformi.

*Fœm.*—*Abdominis* segmento anali leviter concavo-emarginato.

A. Viridi-aut cœruleo-metallica.

B. Viridi-cyanea, lineâ suturali vittâque discoidali cœruleis.

Long.  $3\frac{1}{4}$ — $3\frac{3}{4}$  lin.

*Hab.*—Swiss Alps.

Thorax more than half as broad again as long; sides very slightly rounded, nearly parallel from the base to the middle, anterior angles acute, submucronate; upper surface coarsely punctured, sides thickened, bounded within by an entire, deeply excavated, coarsely and irregularly-punctured sulcation. Elytra broader than the thorax, ovate, dilated posteriorly, coarsely and closely punctured, the interspaces rugose.

*Ch. elongata*, placed by Kraatz under *speciosissima*, is a distinct and well-marked insect; its elongate form, narrow in front and dilated posteriorly in both sexes, will at first sight distinguish it from any allied species; the linguiform *telum* will separate it from the ♂ of *speciosissima*, and the concave apex of the anal segment of the abdomen from the ♀ of the same species.

### *Chrysomela speciosissima*, Scop.

Ent. Carn. p. 231; Suffr. Mon. p. 142.

Oblongo-elongata, convexa; thorace lateribus rotundatis, basi parallelis, rarius a basi ad medium convergentibus, disco evidenter, ad latera foveolato-punctato; lateribus incrassatis, intus sulco lato, rude punctato marginatis; elytris fere parallelis ♂, postice paullo ampliatis ♀, sat crebre aciculato-punctatis; interspatiis leviter rugulosis; palporum maxillarium articulo ultimo ad penultimum vix aequalato, ovato.

*Mas.*—*Tarsorum* articulis basalibus a pede primo ad tertium longitudine perparum incrementibus; *abdominis* segmento anali leviter concavo-excavato, obsolete bisinuato; *telo* modice elongato, regulariter curvato, lateribus parallelis, apice oblique convergentibus, apice ipso paullo recurvato, modice producto, subcuneiformi.



*Fœm.*—*Abdominis* segmento anali obtuse truncato.

A. Viridi-metallica aut viridi-cyanea, thoracis basi elytrorumque lineâ suturali vittâque discoidali cyaneis.

B. Elytris olivaceo-æneis aut æneis, signaturis ut in A.

C. Tota viridi-metallica aut viridi-ænea.

D. Nigra, elytris cupreis.

E. Tota nigra.

F. Tota cuprea.

Long.  $3\frac{1}{2}$ —4 lin.

*Hab.*—Switzerland, Spain, Italy, South of France.

Thorax nearly twice as broad as long; sides usually rounded, parallel at the extreme base, more rarely straight and converging from the base to beyond the middle; disk distinctly punctured; sides thickened, bounded within by a coarsely-punctured longitudinal excavation. Elytra broader than the thorax, oblong, parallel in the ♂, slightly dilated posteriorly in the ♀, convex, aciculate-punctate, interspaces finely rugulose.

*Ch. speciosissima* is very similar in all its parts to *Ch. cacaliæ*. It is, however, smaller, much shorter and broader in proportion to its length; the elytra of the ♀ are also less parallel, being slightly dilated posteriorly.

*Chrysomela elegans*, Aragona.

De Quib. Coleopt. 1830, p. 27.

*Ch. Genei*, Suffr. Mon. p. 147.

Anguste oblongo-ovata ♂; magis ovata ♀, convexa; thorace distincte hic illic disperse punctato, lateribus in-crassatis, intus sulco integro, rude varioloso-punctato marginatis; elytris fortiter aciculato-punctatis, punctis substriatim dispositis; interspatiis nitidis, ad apicem vix rugulosis, sparse irregulariter impresso-strigosis, sparse tenuiter punctatis; palporum maxillarium articulo ultimo ad penultimum fere æquilato, ovato, apice obtuso.

*Mas.*—*Tarsorum* articulo basali modice dilatato, semi-ovato, illis tarsorum posteriorum duorum paullo longioribus; *abdominis* segmento anali apice obtuse truncato; *telo* robusto, valde emvato, apice reflexo, lateribus parallelis, apice abrupte dilatato, hastato.

*Fam.*—*Abdominis* segmento anali apice late obtuso.

A. Viridi-metallica, fronte elytrorumque vittâ discoidali, antice ampliata, postice abbreviata, rufo-aureis.

B. Viridi-cyanea, aeneo tincta, supra aureo-aenea, elytrorum lineâ suturali vittâque discoidali cyaneis; limbo externo viridi-metallico.

Long. 3—3½ lin.

*Hab.*—Piedmontese Alps, Pyrenees, Lombardy.

Antennæ filiform, six outer joints rather more robust than the four preceding ones. Thorax one-half broader than long; sides rounded and converging in front, parallel behind the middle; disk distinctly and rather strongly, but (as a rule) less closely punctured than in *Ch. speciosissima*; lateral margin thickened, bounded within by a deeply impressed, coarsely punctured longitudinal groove. Elytra oblong and broadly rounded at the apex in the ♂, oblong-ovate in the ♀, convex, rather strongly punctured, the punctures obsoletely arranged in irregular longitudinal striæ; interspaces smooth and shining, sometimes faintly wrinkled towards the apex; in var. B. the whole surface is distinctly wrinkled.

*Chrysomela guttata*, Gebl.

Mem. Mosc. v. 1817, p. 316.

*Ch. exanthematica*, Weid. Germ. Mag. Ent. iv. 1821, p. 178.

„ *musiva*, Gebl. Ledeb. Reis. ii. 3, 1830, p. 215.

„ „ Motsch. Schrenck. Reis. ii. 1860, p. 210.

„ *speculifera*, Redt. Hugel. Kaschm. iv. 1848, p. 558.

„ *subaenea*, Motsch. Schrenck. Reis. ii. 1860, p. 229, t. 11, f. 13.

„ *consimilis*, Baly. Trans. Ent. Soc. 1874, p. 172.

Var. A. *Ch. musiva*, var. Gebl. Led. Reis. 1830.

„ *nigrogenmata*, Motsch. Schrenck. Reis. ii. 1860, p. 228.

*Hab.*—Eastern Siberia, Japan, Northern India.

This purely Asiatic and widely-spread species has been described by different authors under various names. It

varies somewhat in size and degree of punctuation, also slightly in coloration; the latter (usually cupreous) being occasionally tinged with metallic blue. Var. A. has the outer limb of the elytra broadly edged with rufous. Specimens from Japan are larger and more coarsely punctured than those from Continental Asia. The duck-billed shape of the ♂ organ and the form of the apex of the anal segment of the abdomen in the ♂ are constant in all the specimens I have examined.

*Chrysomela marginata*, Linn.

Syst. Nat. ed. x. p. 371.

*Ch. songorica*, Gebl. Bull. Ac. Petr. i. 1843, p. 39;  
Bull. Mosc. 1859, iv. p. 25.

„ *sulcata*, Fisch. Cat. Col. Karal. 1843, p. 25;  
Suffr. Mon. p. 82.

*Mas.*—Telum curvatum, subspathulatum, apice vix recurvato, mucronato; ducto filiformi, teli apice longiori.

*Hab.*—Europe, Eastern Siberia.

*Ch. songorica*, Gebl. (*sulcata*, Fisch.), from Eastern Siberia, cannot be considered as more than a local form of *Ch. marginata*; the specimens are usually rather larger, paler coloured and less metallic, and their elytra are often more strongly punctured and the striæ more deeply sulcate, but they vary greatly in all these respects; the form of the *telum* is similar in both.

*Chrysomela Vishnu*, Hope.

Gray, Zool. Misc. 1831, p. 30 (type in Brit. Mus.).

*cingulata*, Baly, Journ. Ent. i. 1860, p. 97.

*Mas.*—Telum linguiforme, vix curvatum.

*Hab.*—India, Nepal.

The present species closely resembles the preceding, and might, at first sight, be taken for a local variety; it differs, however, in the following particulars:—the apical joint of the maxillary palpus is less ovate and more broadly truncate, the basal half of the antennæ is more slender, the third joint being relatively longer than the fourth; the sides of the thorax are also more strongly punctured; the punctures on the elytra are placed at un-

equal distances, but arranged in a more regular line on each stria; and, lastly, the shape of the *telum* is entirely different.

*Chrysomela flavomarginata*, Say.

Journ. Acad. Philad. iii. p. 452; Suffr. Stet. Ent. Zeit. 1858, p. 387.

*Mas.*—Telum oblongum, curvatum, apice recurvato, in mucronem breviorum antrorsum producto.

*Hab.*—Louisiana, Colorado.

Closely allied to *Ch. marginata*. The elytra have the punctures more irregularly placed on the striae, the latter on the outer disk and at the apex being sometimes entirely lost. The *telum*, although formed on the same general plan, is shorter, its sides are more parallel, its apex more distinctly recurved, more obtusely angled, and the apical process is broader and shorter; the duct is stouter, more rigid, and is not produced beyond the apex of the telum. In all other respects this species agrees closely with *Ch. marginata*, of which species in all probability it was originally an offshoot.

*Chrysomela Adamsi*.

Oblongo-ovata, convexa, nigro-aut viridi-cyanea, nitida; thorace evidentem punctato, lateribus incrassatis, sulco longitudinali lato, fortiter, irregulariter punctato, intus marginatis; elytris rufis, sat fortiter subseriatim punctatis.

Long.  $3\frac{1}{2}$ —4 lin.

*Hab.*—Oo Bay, Chinese Tartary (Adams); Eastern Siberia (Schrenck.)

Head remotely punctured, the puncturing rather closer on the clypeus; apical joint of palpus rather broader than the penultimate, its apex truncate. Thorax rather more than twice as broad as long; sides straight and parallel behind the middle, rounded and converging in front; disk moderately convex, distinctly punctured; lateral margin broad, thickened, bounded within by a broad (sometimes interrupted) longitudinal depression, the surface of which is coarsely and irregularly punctured. Elytra rather broader than the thorax, subparallel, their apices (conjointly) regularly rounded; above convex,

coarsely punctured, the puncturing on the inner side arranged in ill-defined irregular striæ.

Scarcely more than half the size of *C. grossa*, to which insect it is nearly allied. It may be known by the shape of the thorax, the sides of which in *grossa* are rounded and converging from base to apex; in the present species they are straight and parallel behind the middle.

*Chrysomela rufo-marginata.*

Ovata, convexa, subtus cum antennis nigra, cupreo vix tincta; supra cuprea; thorace nitido, minuto, ad latera magis fortiter punctato, utrinque basi intra marginem lateralem longitudinaliter foveolato; elytris fortiter et regulariter punctato-striatis; æneo micantibus, limbo exteriori sordide rufo.

Long.  $3\frac{1}{2}$ —4 lin.

Hab.—Mesopotamia.

Head very minutely but not closely punctured; clypeus transverse, depressed, more distinctly punctured than the upper face; antennæ rather slender, not half the body in length, black, the basal joints obscure rufo-piceous. Thorax rather more than twice as broad as long; sides rounded and converging from base to apex, the anterior angles subacute; above convex, very finely and rather distantly punctured, the puncturing rather closer and more distinct at the extreme base, a longitudinal space between the disk and outer margin coarsely punctured; lateral margin not thickened, separated from the disk at the base by a longitudinal fovea and again at the apex by a faint, ill-defined depression. Elytra rather broader than the thorax, convex, the highest part of the convexity being behind their middle; each elytron with eleven strongly-punctured striæ, the first abbreviated, the punctures on each stria placed at irregular intervals, the third and fourth, fifth and sixth and seventh and eighth rows absolutely approximating in pairs; interspaces plane, sparingly impressed with minute punctures; outer limb obscure rufous, the rufous colour entirely covering the outer interspace. About the same size and somewhat similar in form to *Ch. lamina*, elytra punctured as in that insect; it may be easily separated by the different shape of the thorax and by the difference in its lateral margination.

## Genus AMBROSTOMA, Motsch.

Schrenck. Reis. in Amurlande, ii. p. 208.

*Metasternum* margine antico utrinque sulcato, apice immarginato; cæteris ut in *Chrysomelâ*.

The single character given above, as separating this genus from *Chrysomela*, is of more importance than would at first sight appear. In *Chrysomela* and its allies the apex of the metasternum is regularly margined for its whole extent. In *Doryphora*, *Calligrapha*, and all the other American forms (one or two small genera excepted), the anterior margin is bordered within, on either side, by a deep sulcation, the apex itself being immarginate; this form of margination is found in the present genus and also in *Eumela*, *Paralina*, and some Australian genera, showing their closer connection with what may be called the American type than with the European.

1. *Ambrostoma quadri-impressa*, Motsch. Bull. Mosc. 1845, i. p. 109; Schrenck. Reis. ii. 1860, p. 227, tab. 11, f. 11.

*Hab.*—Mongolia.

2. *Ambrostoma fortunei*, Baly, Journ. Ent. i. 1860, p. 94 (*Chrysomela*).

*A. chinensis*, Motsch. Schrenck. Reis. ii. 1860, p. 228.

*Hab.*—Northern China.

3. *Ambrostoma mahesa*, Hope, Gray, Zool. Misc. 1831, p. 30 (*Chrysomela*, type in Brit. Mus.).

*A. nepalensis*, Motsch. Schrenck. Reis. ii. 1860, p. 228.

*Hab.*—Nepal.

## Genus CROSITA, Motsch.

Schrenck. Reisen. ii. p. 189.

*Corpus* ovatum, apterum aut alatum. *Thorax* lateribus incrassato-marginatis. *Elytra* coadnata aut libera. *Metasternum* apice elevato-marginatum. *Pedes, tarsorum* articulis subtus glabris, nitidis, utrinque serie unicâ c setulis rigidis marginatis; articulo secundo apice concavo, angulis acutis; tertio profunde concavo-emarginatâ, lobis acutis;

in ♂ tarsorum anticorum quatuor pulvinis integris; articulis secundo et tertio ut in *Chrysomelâ* formatis.

Three species belong to the above genus, which is purely Asiatic, and is well separated from *Chrysomela* by the peculiar structure of the tarsi.

#### A. Corpus apterum.

1. *Crosita altaica*, Gebl. Mem. Mosc. 1823, p. 117  
(*Chrysomela*).

*Ch. insignis*, Fischer, Cat. Col. Karal. 1843, p. 20.

*Hab.*—Altai, Turcomania.

2. *Crosita Faldermanni*, Krynicky. Bull. Mosc. 1832,  
p. 170 (*Chrysomela*).

*Ch. Maximovitschi*, Zubkoff. Bull. Mosc. 1833,  
p. 337.

*Hab.*—Turcomania.

#### B. Corpus alatum.

3. *Crosita caelestina*.

Elongata, subparallela, subtus nigro-cærulea, supra metallico-cærulea, nitida, thorace transverso, lateribus rotundatis; disco minus crebre punctato, intra marginem lateralem profunde longitudinaliter sulcato, margine ipso incrassato; clytris thorace latioribus, oblongo-ovatis, fortiter punctato-striatis, striis bifariam dispositis, interstitiis sat fortiter, suberebre punctatis.

*Mus.*—*Abdominis* apice obtuse truncato; *telo* robusto, regulariter curvato, apice obtuse truncato; *tarsorum* anticorum articulis modice dilatatis, pulvillis integris.

Long. 4—4½ lin.

*Hab.*—Northern China, India, Persia.

Head remotely punctured; front impressed on either side, just above the clypeus, with a shallow coarsely-punctured fovea; clypeus depressed, more closely punctured than the upper face; apical joint of maxillary palpus not broader than the penultimate, subovate, its apex obtuse; antennæ filiform, less than half the length of the body. Thorax twice as broad as long; sides rounded, converging at base and apex, the anterior angles subacute; disk moderately convex, distinctly and somewhat closely punctured;

lateral margin thickened, broader in the middle, narrowed at base and apex, bounded within by a deep, well-defined, slightly-curved longitudinal groove. Elytra broader than the thorax, oblong-ovate, convex, the basal margin thickened; each elytron with ten rows of longitudinal striæ, the first abbreviated before the middle, the third and fourth, fifth and sixth and seventh and eighth, approximating in pairs; interspaces as strongly punctured as the striæ, in some specimens rendering the latter indistinct.

*Doryphora approximata.*

Late ovata, convexa, rufo-picea, nitida, thorace distincte punctato; elytris regulariter punctato-striatis, olivaceis, picco limbatis, limbo submarginali fulvo.

Long. 5 lin.

*Hab.*—Parana.

Head very minutely punctured; antennæ more than half the length of the body, very slightly compressed and dilated towards the apex; the 4th to the 10th joints nigro-piceous, the basal joint stained above with the same colour. Thorax rather more than twice as broad as long; sides sinuate at the base, dilated and rounded before the middle, the anterior angles mucronate; disk finely and distinctly but not very closely punctured. Scutellum shining, impunctate. Elytra rather broader than the thorax, broadly rounded at the apex; each elytron with eleven rows of distinctly impressed punctures, the first short, the tenth deeply sulcate, the eleventh, on the extreme outer margin, less strongly marked than the rest; interspaces near the suture on the outer margin and towards the apex obsoletely convex; the whole limb on each elytron rufo-piceous, bounded within by a narrow flavous line, which is less defined along the suture than elsewhere. Mesosternal spine nearly equal in length to the metasternum.

Somewhat similar to *D. bilimbata*, but at once separated by its much broader form, more strongly punctured elytra, and the piceous coloration of its body and thorax.

*Doryphora Godmani.*

Rotundato-ovata, sat valde convexa, cuprea, nitida; thorace remote, tenuiter punctato; elytris tenuiter sed distincte punctato-striatis; vittâ interruptâ sublaterali



fasciisque interruptis tribus, unâ subbasali, secundâ prope medium tertiâque ante apicem castaneis.

Long.  $4\frac{1}{2}$ — $4\frac{3}{4}$  lin.

Hab.—Trinidad.

Head very finely and distantly punctured; clypeus transverse, well defined, faintly depressed, rather more strongly so on either side, more strongly and closely punctured than the front; antennæ about half the length of the body, very slightly thickened towards the apex, the basal joint beneath, together with the second at its extreme apex, piceous; mandibles robust, rather larger in the ♂, abruptly angled in the middle in both sexes, coarsely punctured. Thorax more than twice as broad as long; sides straight and parallel from the base to far beyond the middle in the ♂, then rounded and converging to the apex, the anterior angle acute, the hinder one slightly produced, very acute; in the ♀ the sides are less straight and parallel in front, being rounded from just before their middle; apical border deeply excavated; disk transversely convex, faintly excavated on either side, finely and remotely punctured. Elytra broader than the thorax, quadrate-ovate, broadly rounded at the apex, above convex; each elytron with eleven rows of fine but distinct punctures, the first short, those on the outer disk rather confused; interspaces plane, impunctate; each elytron with a submarginal irregularly interrupted castaneous vitta and three (also interrupted) concolorous fasciæ, one just below the basal margin, one across the middle, and a third some little distance before the apex; these fasciæ, which externally join the submarginal vitta, are formed of irregular spots and probably in some specimens are nearly obsolete. Sternal spine acute, equal in length to the metasternum.

Nearly allied in form to *D. astuans*, rather larger than that species, the sides of the thorax more parallel.

#### *Doryphora fulvopustulata.*

Ovata, ad apicem attenuata, convexa, picea, nitida, capite thoraceque subnitidis, aeneo tinctis, antennarum articulis ultimis duobus albido-flavis; thorace sat fortiter granuloso, suberebre punctato; elytris subseriatim punctatis, granulosis, utrisque pustulis levibus sex, duobus

infra basin, duobus prope medium duobusque ante apicem, fulvis ornatis.

Long. 5 lin.

Hub.—Columbia, Medellin.

Head granulose, distinctly punctured; labrum rufopiceous. Thorax more than twice as broad as long; sides straight, converging from the base towards the apex, abruptly rounded at the latter, the anterior angles strongly mucronate, the hinder ones acute; disk faintly excavated on either side, granulose, subopaque, impressed with round shining punctures, rather larger and more crowded at the sides than on the middle disk. Elytra broader than the thorax; sides subparallel from the shoulder to below the middle, thence obliquely converging and conjointly forming at the apex a distinct angle; above convex, gibbous just before the middle, thence obliquely deflexed to the apex; surface subopaque, rather strongly punctured, the punctures arranged in irregular longitudinal striæ, interspaces granulose; each elytron with six slightly-raised, shining, impunctate fulvous spots, two at the base, the first on the humeral callus, extending upwards to the basal margin, the second rather lower, placed near the suture; two placed obliquely about the middle, one on the outer, the other on the inner disk; and lastly, two others, also obliquely placed halfway between the middle and the apex; these spots standing exactly under each other, form two longitudinal rows on each elytron.

Very nearly allied in form and coloration to *D. brunneipennis*, Jacoby, but scarcely more than half the size, more strongly punctured, and easily to be separated by the fulvous spots in the elytra, which, being slightly thickened, shining and impunctate, stand up in strong contrast to the opacity of the general surface. In one of my specimens of *D. brunneipennis* I find very faint indications of spots arranged in a similar manner, but they are not thickened, and are subopaque and sculptured in a similar manner to the rest of the disk.

## DESCRIPTION OF PLATE II.

- Fig. 1. *Ch. speciosa*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, apex of anal segment of abdomen, ♂ and ♀.
- „ 2. „ *gloriosa*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, anal segment of abdomen, ♂ and ♀.
- „ 3. „ *bifrons*: *a*, telum; *b*, apex of ditto; *c*, apex of anal segment of abdomen, ♂ and ♀.
- „ 4. „ *nivalis*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, anal segment of abdomen, ♂ and ♀; *e*, anterior tarsus, ♂.
- „ 5. „ *intricata*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, anal segment of abdomen, ♂ and ♀.
- „ 6. „ *aleyonea*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, apex of anal segment of abdomen, ♂.
- „ 7. „ *tristis*: *a*, telum; *b*, apex of ditto; *c*, apex of anal segment, ♂ and ♀.
- „ 8. „ *cacaliæ*: *a*, telum; *b*, apex of ditto; *c*, anal segment of abdomen, ♂ and ♀.
- „ 9. „ *speciosissima*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, anal segment of abdomen, ♂ and ♀.
- „ 10. „ *elegans*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, apex of anal segment of abdomen, ♂ and ♀.
- „ 11. „ *sulcata*: *a*, telum; *b*, apex of ditto; *c*, palpus; *d*, apex of anal segment of abdomen, ♂ and ♀.
- „ 12. „ *cinctipennis*: *a*, telum; *b*, apex of ditto.
- „ 13. „ *marginata*: *a*, telum; *b*, apex of ditto.
- „ 14. „ *rishnu*: *a*, telum; *b*, apex of ditto.
- „ 15. Underside of tarsus of *Crosita*.
- „ 16. Apex of metasternum of *Ambrostoma*.
- „ 17. Apex of telum of *Ch. elongata*.



XIII. *A Decade of new Cetoniidæ.* By J. O. WESTWOOD, M.A., F.L.S., &c.

[Read June 4th, 1879.]

(Plates III. and IV.)

Genus novum, NYASSINUS.

CAPUT medioere, clypei apice reflexo; in mare angustato. Mandibulæ latæ curvatæ apice obtuso, intus lobo setoso instructæ. Maxillæ lobo apicali elongato curvato, apice in dentem acutum producto, lobi interni apice bidentato. Mentum oblongum subquadratum, extus gibbosum, et pone basin paullo constrictum. Prothorax subhexagonus, angulis posticis obtusis retroproductis, canali dorsali impressus. Elytra oblonga, extus pone basin emarginata, singulo carina submedia notato; tubercula ordinaria spiraculifera prominentia. Abdomen maris infra basi impressione ovali parum profunda notatum. Pedes breves crassi, tibiis anticis extus fere inermibus præsertim in mare, in foemina prope medium parum angulatis. Tarsi 5-articulati. Corpus supra plus minusve villosum. Prosternum omnino inerme. Mesosternum parvum angustum apice obtusum vix prominens.

This new African genus differs from *Genuchus*, *Lisso-genius* and *Scaptobius* in the simple condition of the anterior tibiæ, which in the females alone exhibit the slightest approach to a central tooth on the outer margin by a small angulation. From *Cænochilus* it differs in having the upper lobe of the maxillæ simple, terminating in a sharp sickle-shaped point. The five-jointed tarsi remove it from *Callynomes*, and the structure of its sterna separate it from *Cymophorus* and its allies.

The two species here described have been discovered in the neighbourhood of Lake Nyassa.

Species 1. *Nyassinus maculipes.* (Pl. III. fig. 1.)

Obscurus; fuscus, luteo, brunneo nigroque variegatus; pedibus luteo-fulvis, tibiis in medio nigro-maculatis tar-

sorum articulis apice nigris, podice emarginato, in medio supra albo.

Long. corp. fere lin. 6.

Habitat ad ripas lacûs Nyassa. In Mus. Hopeiano, Oxoniæ, Parry, Higgins, Janson, Fry.

This species is more variegated than *N. lugubris*, but the colours are greatly confused together. The head is punctured: the prothorax is subhexagonal, with a deep longitudinal central depression, the surface of which is marked with numerous very fine curved and longitudinal strigæ; there is a small tubercle on each side, about one-third of the distance from the anterior angle. The lateral angles are sharp and the posterior angles are prominent, produced backwards and slightly elevated, leaving a depression within the posterior angles. The posterior margin is emarginate on each side, and rounded and entire in front of the scutellum. The disc is black and the sides ferruginous, varied with luteous villosity. The elytra have the shoulders very prominent, rounded, elevated, and fulvous, with a deep round impression within the humeral angle, terminated within by the curved and raised carina, which extends nearly to the apex of the elytra, terminating in the ordinary subapical tubercle; the sutural space between the carinæ is deeply impressed, with its sides gradually elevated and marked with cicatricose punctures; towards the subhumeral impression it is black, followed by a luteous, transverse, villose fascia; towards its extremity it is darker, but varied with ferruginous and black. The apical tubercle of each elytron is conical and fulvous, with a small point on the outside of each. There is also a raised lateral tubercle on each elytron beyond the middle, outside of the carina. The lateral margins of the abdominal segments are exposed and rounded, the two ordinary spiracular tubercles conical, and the podex emarginate at its extremity and white in the middle. The legs are fulvous varied with black, the tibiæ having a black central fascia, and the tarsi are fulvous with the joints black at the ends. The middle of the ventral surface of the abdomen is clothed with white pile, through which a few oblong cicatricose punctures are visible.

*Nyassinus lugubris.* (Pl. III. fig. 2.)

Obscurus saturate ferrugineus, nigro variegatus luteoque setosus, clypeo luteo nitido, pedibus fulvo-brunneis, podice

rotundato; elytris punctis oblongo-ovalibus cicatricosis impressis; carina alternatim fulvo nigroque variegata.

Long. corp. lin.  $5\frac{1}{4}$ .

Habitat eum precedente. In Mus. Hopeiano, Oxoniæ, &c.

This species very closely agrees with *N. maculipes*. It is, however, much less varied in its colouring, and has the upper surface of the body more regular with the tubercular prominences less visible. The clypeus of the male is much narrowed, recurved, fulvous and glossy. The thorax agrees in shape with that of the preceding species, the disc marked with very fine parallel strigæ; the elytra are similar in form and sculpture to those of *N. maculipes*, but less distinctly tubercular, and with the carinæ less sharply defined, the ordinary subapical tubercles are concolorous, each terminating in a point with a smaller point on the outside of each, the spiraculiferous tubercle near the extremity of the abdomen acute and the podex obscurely luteous, with a slight central longitudinal raised line; the body and legs beneath are fulvous-red, the metasternum black in the middle and the four basal segments of the abdomen white, except at the sides; they are but slightly impressed in the males.

*Scaptobius Parrianus*. (Pl. III. fig. 3.)

Subelongatus et angustus, castaneo-piceus, setis luteis brevissimis indutus; capite inter oculos carina brevi parum elevata instructo; pronoto punctato, in medio longitudinaliter impresso, et striolato, lateribus in medio subrotundatis parum serratis, angulis posticis retroproductis; elytris haud tuberculatis, singulo costis duabus punctatis distinctis notato; epimeris luteo setosis, tibiis anticis latis, fortiter 3-dentatis, tarsis 4-articulatis.

Long. corp. lin.  $5\frac{1}{3}$ .

Habitat Transvaal. In Mus. Parry.

This species differs from *S. capensis*, as well as from *S. pentarthrius* and *S. caffer*, in wanting the tubercles on the elytra. *S. pentarthrius*, moreover, has 5-jointed tarsi, and *S. caffer* a very different shaped prothorax. From *S. aciculatus* and *Natalensis* it differs in its more elongate and narrow form, with the costæ of the elytra more strongly marked, the anterior tibiæ much broader and more strongly 3-dentate, the central impression of the middle of the pronotum more distinct, the epimera luteo-setose, and the head with a slight elongate tubercle

between the eyes. The mentum is wider than long, with the front margin nearly straight, the sides rounded, the base terminating in a central triangular flat tooth and the middle of the disc with a deep longitudinal impression. The disc of the pronotum is finely punctured, the hind-part marked with fine parallel strigæ. The abdomen is convex, with a transverse deep impression at the base of the penultimate segment.

*Phymatopteryx glaberrimus.* (Pl. III. fig. 4.)

Castaneus fulvo variegatus, nitidissimus lævissimus, subplanus; capite punctato, pronoti disco subplano, impressionibus 8 rotundatis, mediis duabus majoribus punctatis; scutello elongato lævi fulvo utrinque linea punctorum notato; elytris castaneis, sutura elevata fulva, singulo linea longitudinali curvata profunde impressa media, e basi ad tuberculum subapicale extensa, tuberculisque tribus luteis (in singulo) in lineam curvatam positis.

Long. corp. lin.  $4\frac{2}{3}$ .

Habitat prope lacum N'gami. In Mus. Parry.

This beautiful little insect is rather smaller, flatter and more glossy than *Phymatopteryx sculptilis*, Westw. Thes. Ent., Pl. VIII. fig. 1. The pronotum is elegantly varied with fulvous, the anterior angles being almost destitute of punctures; the excavated depressions of the pronotum are smaller than in *Ph. sculptilis*, the central anterior one being scarcely impressed, although it is punctured; the posterior angles are rounded, within which the surface is punctured. The elytra are very glabrous and almost destitute of punctures; the three glabrous luteous tubercles beyond the middle of each elytron form a curved line rather than arranged in a triangle, as in *Ph. sculptilis*. The podex has two fulvous apical carinæ. The legs are castaneous, with a patch of fulvous in the middle of each tibia.

I cannot avoid expressing the doubt which I have long entertained, that Dr. Burmeister's *Uloptera planata* is congenerous with *Phymatopteryx*, entirely agreeing, as it does, therewith, except in the maxillary palpi being securiform. "Palpis maxillaribus securiformibus inter omnia Melitophila hoc genus potissimum notatur," are the words of Dr. Burmeister, whose type *Ul. planata* was described from the collection of M. Buquet as an inhabitant of Cayenne.

I have given figures of the details of the mouth of



*Ph. sculptilis* in my Thesaurus, and of those of *Ph. glaberrimus* in the accompanying figures, both agreeing in the form of the maxillary palpi. If my conviction be correct, the description, therefore, of the maxillary palpi and the locality of *Ul. planata* are both incorrect, and my genus *Phymatopteryx* must be expunged. If, on the contrary, Dr. Burmeister's descriptions should prove to be correct, it will be a singular instance of two such remarkable and otherwise identical forms occurring in South America and Africa; *Ph. sculptilis* being a native of Guinea and *Ph. glaberrimus* of Lake N'gami.

*Epixanthis maculitarsis*, Burm. Handb. iii. p. 586.  
(Pl. III. fig. 5.)

Lata depressa, nigra, velutina, clypei apice furcato, pronoto leviter punctato; margine omni tenui lineaque media fulvis, elytris fasciis tribus undulatis fulvis, fasciis 1 et 2 linea fulva longitudinali connexis margineque postico tenui fulvo; pedibus nigris, tarsis fulvis articulis apice nigris.

Long. corp. lin. 9; lat. hum. elytr. lin.  $4\frac{1}{2}$ .

Habitat Madagascar. In Mus. Hopeiano, Oxoniæ.

This curiously-marked species from Madagascar has not hitherto been figured. It is broad and depressed and of a velvety-black colour, destitute of gloss; the head is small and thickly punctured, the front produced conically, terminating in two small points. The antennæ are dark pitchy. The prothorax is broad, with the sides nearly rounded in the middle, behind which they are nearly straight and parallel. The disc is slightly punctured. The entire margin of the pronotum is narrowly fulvous; the hind margin entire, and gradually rounded in front of the scutellum, and there is a narrow fulvous central line, widening as it joins the fulvous hind margin. The scutellum is obscure with the centre fulvous. The elytra are singularly marked, being divided into areas by narrow fulvous marks, which may be described as forming three irregularly-curved transverse bars, the first broken towards the lateral margin, and the first and second united by a narrow, curved longitudinal line extending from the shoulders. The third of these transverse fasciæ is also broken in the middle, the suture and hind margin being also narrowly fulvous. The ground of each elytron is velvety-black, with two fine longitudinal impressed lines

on each. The undersurface of the body is black and glossy, with fulvous setæ and a few punctures on the abdominal rings. The mandibles are furnished with a very narrow blade, acute at the tip, with an inner slightly setose lobe and with a broad robust molar plate. The maxillæ have both lobes simple and thickly setose, and the mentum is broad, subhexagonal and emarginate in front. The mesosternum is very shortly and but slightly produced into a short broad point in front.

*Pygora ignita.* (Pl. IV. fig. 1.)

Oblonga subdepressa lævissima nitidissima læte aureo-viridis, elytrorum apice lateribusque igneis; prothorace subconico truncato, vittis duabus longitudinalibus impressis chalybæis; elytris linea parum curvata subsuturali profunde impressa, altera discoidali, tertiaque punctata pone medium, pedibus castaneis aureo-viridibus.

Long. corp. lin. 7; lat. humer. elytr. lin. 4.

Habitat Madagascar. In Mus. Higgins.

This beautiful insect is remarkable not only for its brilliant colour, but for the highly-polished surface, the head is finely punctured, the antennæ fulvous, the clypeus emarginate; the prothorax is gradually widened from the head to the hind angles, being but very slightly angulated in the middle of its lateral margins. Its hind margin is but slightly emarginate in front of the scutellum, which is golden-green. The sides of the pronotum, next the anterior angles, have a series of dark punctures, and towards the hind angle a fine impressed line. On the disc on each side is a deep longitudinal steel-blue impression; the scutellum has its base covered with minute semicircular transverse lines.

The elytra are highly polished with a very deep impressed line on each side of the suture, having a series of punctures in the deepest part; these two lines are wider apart about the middle of the suture, and succeeded by another nearly straight line of the same kind, between which and the lateral margin is a third much shallower line formed of impressed punctures. The legs are light chestnut, with a golden-green gloss. The body beneath is golden-green, with black punctures, the abdominal rings being but slightly punctate. The maxillary lobes are simple, the mentum oblong, emarginate in front, and the metasternum is broad, short and obtusely rounded in front.

*Anochilia Hydrophiloides*. (Pl. IV. fig. 2.)

Ovalis convexa nigra, nitida, capitis clypeo bifido, elytrorum singulo striis 6 punctatis notato.

Long. corp. lin. 10; lat. humer. elytr. fere lin. 5.

Habitat in Madagascar. In Mus. Higgins.

This species has very much of the general appearance and size of *Hydrophilus caraboides*. It is entirely black, oval, very polished, but slightly punctured, and each elytron is marked with six punctate striae. The head is finely punctured, the clypeus produced and deeply notched, with a sharp elevated line extending nearly from the extremity of each side to the eye. The pronotum is convex, scarcely angulated in the middle of each lateral margin, and almost impunctate. The hind margin in front of the scutellum is emarginate, the scutellum is glabrous. The elytra are convex, each marked with six punctured striae, of which the two most outward ones are abbreviated. The apex of the elytra is also punctured. The podex is covered with extremely fine transverse lines. The legs are black, the anterior tibiae but moderately tridentate. The maxillary lobes are simple and strongly setose, the mentum cup-shaped, deeply impressed on the outside near the base, and with a very deep notch in front; the mesosternum is produced into a strong obtuse point, directed obliquely downwards towards the forelegs.

*Anochilia herbacea*. (Pl. IV. fig. 3.)

Oblongo-ovalis, opaca velutina viridis, aureo parum tincta, elytris punctato-striatis, pedibus nigris, tarsis castaneis.

Long. corp. lin.  $7\frac{1}{2}$ ; lat. humer. elytr. fere lin. 4.

Habitat in Madagascar. In Mus. Higgins.

This insect is of an uniform velvety rather dark-green colour, tinged with fulvous on the hind part of the thorax and scutellum. The head is thickly but finely punctured, with the clypeus rather deeply notched in front, the antennae are black; the prothorax is nearly semicircular, the lateral margins being scarcely angulated in the middle, and the hind margin but slightly emarginate in front of the scutellum. It is considerably convex, and its hind part is rather thickly punctured, the scutellum is impunctate, and each of the elytra is marked with six longitudinal striae; the first next the suture is bent rather outwardly in

the middle; the second extends from the base of the elytra to the inside of the subapical tubercle; the third and fourth extend from the base, but do not quite reach the tubercle, and the fifth and sixth are gradually shorter, all these striae having punctures in their deepest part; the legs are black, with the tarsi pitchy. The maxillary lobes are simple, and densely setose, the mentum broad, with the fore margin deeply emarginate, and the mesosternum is broad, rounded at the sides, and obtuse in front. The anterior tibiæ are strongly tridentate.

*Liostraca* (?) *rufo-plagiata*. (Pl. IV. fig. 4.)

Oblonga subparallela depressa, nigra nitidissima, elytris profunde striatis, singulo plaga magna laterali ferruginea ante medium notato.

Long. corp. lin. 5¼.

Habitat Madagascar. In Mus. Higgins.

This species has the prothorax large, wide, and but slightly narrowed from the middle of the straight lateral margins to the eyes, the head being wide, and the humeral angles of the elytra not very greatly produced, so that the insect has a more parallel appearance than usual. The head is very finely punctured, with the clypeus rounded, its fore-edge slightly emarginate. The pronotum is very glossy, having the lateral and posterior margins with a slender raised edge, it is subdepressed, and has its anterior portion, especially at the sides, punctured. The elytra are glossy and black, finely punctured at the base, the sides near the shoulders considerably emarginate, each elytron having a large lateral ferruginous patch between the shoulders and the middle, and four deep striae, of which the lateral one is formed of deep punctures; the podex is black, with a raised central longitudinal line.

The maxillæ have the terminal lobes simple, and strongly setose, the mentum is cup-shaped, deeply notched in the middle of the fore margin, and the mesosternum is produced into a triangular prominent point between the middle legs. The fore tibiæ are strongly tridentate.

*Gametis* (?) *clytus*. (Pl. IV. fig. 5.)

Elongatus gracilis clytiformis, niger, velutinus, prothorace fere circulari, punctato, undique albo tenue marginato; scutelli apice albo; elytris macula laterali

ferruginea lineis que tribus plus minusve interruptis transversis albis; pedibus elongatis.

Long. corp. lin.  $6\frac{1}{2}$ ; lat. humer. elytr.  $2\frac{2}{3}$ .

Habitat in Madagascar. In Mus. Higgins.

This curious species, which I have referred with much doubt to the genus *Gametis*, might be easily mistaken, both from its general form and markings, for a species of the Longicorn genus *Clytus*. It is black and velvety, the head and prothorax finely punctured, the former elongated, with the clypeus emarginate. The pronotum is nearly circular, the anterior angles being only slightly advanced behind the eyes; it is black, velvety and finely punctured, having a narrow edging of white extending entirely round, leaving, however, the posterior lateral angles black and slightly raised. The scutellum is black, with the posterior part white, with a very fine raised central line. The elytra are nearly flat, narrow, with the humeral angles prominent and rounded at the base: they are finely punctured, and each is marked with a fine impressed longitudinal line next the suture, not reaching the extremity; beyond the middle this is accompanied by a second line, and the basal half of each elytron is also marked with two very fine longitudinal impressed lines; between the shoulders and the middle of each side there is a ferruginous marginal spot, within which is a slender interrupted transverse white fascia, followed by a second much abbreviated one; a third, angulated in the middle, is placed at a little distance beyond the middle. The legs are long and slender, the anterior tibiæ tridentate, the middle and hind pair with a small tooth beyond the middle. The body beneath is black, the deflexed sides of the prothorax and metasternum and terminal segment of the abdomen ferruginous. The underside of the hind femora and the margins of some of the abdominal segments are white. The maxillæ have their two lobes simple and thickly setose, the mentum is elongate-cup-shaped, with the anterior margin rather deeply emarginate. The prosternum is armed with a deflexed spine in front. The metasternum is small and but slightly produced into a short triangular point.

The very narrow form and the nearly circular pronotum, not emarginate in front of the scutellum, removes this species from *Stenotarsia*.

## DESCRIPTION OF THE PLATES.

- Pl. III. fig. 1. *Nyassinus maculipes*: 1a, mandible; 1b, maxilla; 1c, mentum and labial palpi; 1d, the same seen sideways.
- „ fig. 2. *Nyassinus lugubris*: 2a, head of male; 2b, the same seen sideways; 2c, head of female; 2d, the same seen sideways; 2e, anterior tibia and tarsus of male; 2f, the same of the female; 2g, mesosternum; 2h, the same seen sideways.
- „ fig. 3. *Scaptobius Parrianus*: 3a, mentum seen externally.
- „ fig. 4. *Phymatopteryx glaberrimus*: 4a, mandible; 4b, maxilla; 4c, mentum and labial palpi.
- „ fig. 5. *Epixanthis maculitarsis*, Burm.: 5a, mandible; 5b, maxilla; 5c, mentum and labial palpi; 5d, mesosternum; 5e, the same seen sideways.
- Pl. IV. fig. 1. *Pygora ignita*: 1a, maxilla; 1b, mentum and labial palpi; 1c, mesosternum; 1d, the same seen sideways.
- „ fig. 2. *Anochilia Hydrophiloides*: 2a, maxilla; 2b, mentum and labial palpi; 2c, mesosternum; 2d, the same seen sideways.
- „ fig. 3. *Anochilia herbacca*: 3a, maxilla; 3b, mentum and labial palpi; 3c, mesosternum; 3d, the same seen sideways.
- „ fig. 4. *Liostraca* (?) *rufo-plagiata*: 4a, maxilla; 4b, mentum and labial palpi; 4c, mesosternum; 4d, the same seen sideways.
- „ fig. 5. *Gametis* (?) *clytus*: 5a, maxilla; 5b, mentum and labial palpi; 5c, prosternal point and base of head; 5d, mesosternum; 5e, the same seen sideways.

XIV. *Contributions to a knowledge of the Hemipterous Fauna of Madagascar.* By W. L. DISTANT.

[Read June 4th, 1879.]

(Pl. V.)

Two of the first Hemipterous insects described from this large island and peculiarly-interesting zoological province, were *Plataspis Coccinelloides* by Laporte in 1832 and *Ptyelus Gondoti* by Bennett in 1833. Blanchard and Guérin both also added to our knowledge of this Hemipterous fauna; and Coquerel also described several species. It was, however, Dr. Signoret, in the years 1860-61, who first contributed any general knowledge on the subject. In two papers devoted respectively to the *Homoptera* and *Heteroptera* he enumerated most of the known species and described many new forms. These were subsequently nearly all re-described by Dr. Stål in his "Hemiptera Africana," in which work, and also in his later "Enumeratio Hemipterorum," several new species were characterized. Further slight additions to our knowledge have been made by Vollenhoven, Walker and myself. These authors are almost our whole authorities, and though, in the following paper, twelve other species are described, yet all combined will possibly give but a poor summary of the *Hemiptera* of this rich entomological fauna. We must await M. Grandidier's great work for further information.

For these reasons it is futile to attempt any elaborate generalisation as to geographical affinities of the whole Hemipterous fauna, the following merely refers to the insects described in this paper.

One genus, *Ulpus*, is peculiar to Madagascar, according to our present knowledge.

Two genera, *Agonoscelis* and *Mictis*, are also found in the Ethiopian, Oriental and Australian regions.

Three genera, *Mygdonia*, *Enithares*\* and *Platypleura*, are only found in the Ethiopian and Oriental regions.

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\* This genus has probably a wider range.

The genus *Piezosternum* is common to the Ethiopian and Neotropical regions, whilst *Pantoleistes* has hitherto been recorded from the Ethiopian only.

*Agonoscelis bicolor*, n. sp. (Pl. V. fig. 6.)

Head black, with three small reddish spots at base, two situated a little in front of eyes, and one about centre of basal border; lateral lobes longer than the central. Pronotum dull sanguineous, thickly and strongly punctate and irregularly rugulose, with a broad black border, which, commencing at lateral angles, extends about halfway along lateral margin, when it is suddenly reflexed and extends transversely across disc to near centre. Scutellum black, with a small obscure spot at centre of base, and apex broadly dull sanguineous; thickly punctate and strongly, transversely and irregularly rugose. Corium dull sanguineous, with the lateral border, which gradually widens from base and bifurcates at apex, enclosing a triangular space on apical margin; black, thickly punctate and rugulose. Membrane pitchy black, fuscous at tip, which extends considerably beyond apex of abdomen. Body beneath pale reddish, with the following black macular markings; a linear slightly-curved series on each side, commencing one on prosternum, one on mesosternum and one on metasternum, is continued along the abdomen one on each segment—a central row of six, arranged in pairs, on disc of abdomen, a small stigmatal series, and a large marginal subtriangular series arranged one at each segmental incisure. Legs and rostrum black.

The body is sparingly and the legs strongly pilose.

Long. 12 mill.

Antananarivo.

*Piezosternum rubens*, n. sp. (Pl. V. fig. 8.)

Olivaceous, thickly and finely punctured. Head paler in coloration with the ocelli red; in front of the ocelli are two short black striæ situated on each side of inner margin of the lateral lobes, and a central fuscous longitudinal fascia. Antennæ black, 1st joint robust, olivaceous on inner margin, 2nd about twice as long as 3rd, 4th almost as long as 2nd and 3rd together, luteous at apex, 5th and 2nd subequal. Pronotum with the lateral margin black and a central longitudinal impunctate im-



pression which is also continued through the scutellum to near the apex which is pitchy. Inner claval margin and base, base of costa and a subcostal streak to corium (the last extending through half its length) pitchy. Membrane brassy. Abdomen above red with bluish reflexions, connexivum olivaceous with a broad black fascia at the marginal incisures. Body beneath pale olivaceous, marginal borders of prosternum, mesosternum and metasternum, a central longitudinal line extending through sternal keel to apex of abdomen, segmental borders, stigmata and a stigmatal row of short fasciae somewhat thickened at each end, black. Rostrum pitchy-olivaceous, reaching a little beyond apex of sternal keel. Legs olivaceous, somewhat pitchy.

Long. 20 to 21 mill. ; exp. pronot. ang. 10 to 11 mill.  
Antananarivo.

Allied to the African species. *P. calidum*, Fab.

Abdomen above bluish-green.

Ventral keel about reaching anterior coxæ. *P. calidum*, Fab.

Abdomen above red.

Ventral keel not reaching anterior coxæ. *P. rubens*, Dist.

All the black markings beneath in *P. rubens* are much broader, and the posterior margins of the pronotal angles less excavated than in *P. calidum*.

*Mygdonia elongata*, n. sp. (Pl. V. figs. 2, 2a, 2b.)

Black. Head clothed with fine yellowish pubescence. Antennæ very dark castaneous, apical joint somewhat paler. First and 4th joints longest, subequal, 2nd longer than 3rd. Pronotum granulate and rugulose, with the lateral angles produced transversely, broadly and subacutely, and two submarginal basal tuberculous points parallel to basal angles of scutellum. Scutellum transversely and irregularly rugulose, with the apex narrowly and obscurely fuscous. Corium thickly and finely punctured, faintly tuberculate. Membrane opaque. Abdomen above body beneath and legs concolorous, tarsi castaneous, 1st joint thickly covered below with yellowish pile.

The body and legs are very faintly pilose. Scutellum with the breadth and length subequal. Body beneath with second segment much the broadest, its apex produced posteriorly and forming anterior half of a large raised tubercle deeply sinuated on disc, which occupies the greater

part of the discal portion of third segment. There is also a faint transverse linear tuberculous ridge on disc of basal margin of the second segment. The posterior femora are gradually thickened, curved at base, unarmed, faintly tuberculous along inner margin, about as long as posterior tibiæ and tarsi together. The posterior tibiæ are dilated on each side, outwardly from base to about half their length, inwardly gradually widening from base and apex to a broad acute tooth about the middle. Intermediate femora slightly dilated beneath near apex with a strong subapical spine. Coxæ gradually widened apart; anterior close together, intermediate much wider apart but less so than posterior.

Long. 28 mill.; exp. pronot. ang. 11 mill.; exp. body at base of cor. 8 mill.

Antananarivo.

I possess one small ♂, measuring only 25 mill., in which the tuberculous ridge on disc of basal margin of second segment is almost obsolete.

This species cannot well be confused with *M. tuberculosa*, Sign., the only other African species to which the genus is now restricted.

♀. Antennæ relatively shorter and brighter castaneous, pronotal angles somewhat less prominently produced, posterior femora very slightly thickened and posterior tibiæ not toothed internally.

*Mictis expansa*, n. sp. (Pl. V. figs. 1, 1a.)

♂. Above purplish-brown. Head and anterior margin of pronotum pitchy, clothed with ochreous pubescence. Antennæ bright castaneous, apical joint excepting base black. First joint longest, 2nd a little longer than 3rd, 4th and 2nd subequal. Pronotum rugose and granulate, the lateral angles much produced into acute processes, directed somewhat upwards and forwards with the margins faintly crenulated. Anterior lateral angles much more distinctly crenulated. Scutellum transversely and coarsely wrinkled. Clavus much streaked with pitchy, in some specimens concolorous. Corium thickly and finely punctate. Membrane brassy-black. Abdomen above black, with two luteous spots on base of fifth segment. Body beneath concolorous (in other specimens somewhat darker). Coxæ, trochanters, tibiæ and apices of femora somewhat pitchy; tarsi luteous.

The body and legs are faintly clothed with ochreous pile. Abdomen beneath with a large subconical tubercle, situated on apex of first and base of second segment, the second segment much widened posteriorly and extending in a rectangular process nearly across third segment, which is gibbous and slightly and posteriorly produced at apex. The posterior femora are unarmed (with the exception of two small tubercles on inner margin near apex), curved and thickened, about as long as tibiæ and 1st joint of tarsi together. The posterior tibiæ are dilated internally into a broad tooth a little above centre of inner margin. A submarginal, transverse, linear ridge at base of pronotum.

Long. 27 mill.; exp. pronot. ang. 15 mill.

Antananarivo.

♀. Abdomen somewhat dilated on both sides. Abdomen beneath unarmed, but second segment slightly produced and rounded at central basal portion over third segment, which is somewhat hollowed on disc. Hind femora very little thickened, and hind tibiæ only slightly dilated on inner margin.

This species has somewhat a likeness to the forms comprised in the genus *Prionolomia*, Stål, but differs at once from that genus in the relative lengths of the 1st and 4th antennal joints. After a thorough examination, I have placed it in the genus *Mictis*, from all other species of which it is easily differentiated by the expanse of the pronotal angles.

#### *Parabrachytes*, nov. gen.

First joint of antennæ a little shorter than 2nd, longer than head; 1st, 3rd and 4th joints subequal; apices of 2nd and 3rd joints incrassated, that of 2nd joint much more strongly so and pectinated; pronotal angles moderately dilated and somewhat rounded; abdomen moderately dilated on each side; femora spined near apices.

This genus could be included in Stål's division *Brachytaria*, by having the 1st joint of the antennæ shorter than the 2nd, and by the rostrum reaching only just beyond anterior coxæ, not to middle of mesosternum, but it differs in having the 1st joint longer than the head, as in Stål's division, *Daladeraria*. It is allied to *Brachytes*, from which it differs by the much greater relative length of the 1st to 2nd joints of antennæ, by the incrassated apices of

the 3rd and 4th joints, the moderately-produced pronotal angles, &c.

*Parabrachytes coloratus*, n. sp. (Pl. V. fig. 3.)

Head luteous, strongly emarginate between the antenniferous tubercles. Antennæ black, pilose (apical joint less strongly so). First joint with the base strongly, its apex and base of 2nd joint narrowly, luteous; 1st joint a little shorter than 2nd, 3rd rather shorter than 4th, apices of 2nd and 3rd joints incrassated, 2nd more so than 3rd. Pronotum black, thickly and coarsely punctured, the lateral angles slightly prominent and acutely rounded. Scutellum black, transversely rugose, slightly gibbous at base. Corium castaneous, thickly punctured, lateral margins narrowly black. Membrane black. Abdomen above dull reddish, with a toothed internally black margin; connexivum alternately black and luteous. Body beneath black, femora luteous clouded with black, tibiæ black with bases luteous, tarsi pitchy. Rostrum pitchy, extending a little beyond anterior coxæ. Fore and intermediate femora, with two rows of spines, increasing in size on nearing apex; hind femora faintly spined, two or three visible near base, and one long and slender near apex.

♀. Differs from the ♂ in having the basal portion of upper surface of head black, 1st joint of antennæ wholly luteous, apical joint pale fuscous. Abdomen above bright red.

♂. Long. 21 mill.; exp. lat. ang. pronot.  $7\frac{1}{2}$  mill. Max. lat. abd. 10 mill.

♀. Long. 22 to 24 mill.

Antananarivo.

*Parabrachytes obscurus*, n. sp.

Dull ochreous, tinged with fuscous, thickly and strongly punctured. Antennæ with the apical joint black, robust; remainder luteous, apices of 2nd and 3rd and base (narrowly) of 4th joint black. Apex of 2nd joint very strongly incrassated, apex of 3rd slightly so. Pronotum in structure much as in preceding species. Scutellum transversely rugulose, with the base somewhat gibbous; black, basal angles, lateral margins and apex ochreous. Membrane pale brownish, with the base and some discal spots fuscous. Abdomen above red, with a marginal row

of three black spots on each side; connexivum dark castaneous, with two luteous streaks at base and one near apex. Body beneath dull castaneous, stigmata pale luteous. Legs luteous, femora much suffused with black, tibiæ with the base, apex and intermediate spots of the same colour. Rostrum reaching a little beyond base of mesosternum. Femora spined as in preceding species, but hind femora more strongly so.

Long. 18 mill.; exp. pronot. ang. 7 mill. Max. lat. abd.  $8\frac{1}{2}$  mill.

Antananarivo.

*Pantoleistes grandis*, n. sp. (Pl. V. fig. 5, 5a.)

Black, sparingly pilose; apex of head and base of rostrum narrowly,—subcentral portion of 1st joint of antennæ and basal two-thirds of 2nd joint,—central transverse fascia on margin of anterior border of posterior lobe of pronotum,—apices of femora,—bases and apices of tibiæ and posterior lateral borders of dilated first, second and fourth abdominal segments,—luteous. Clavus, basal and apical angles of corium and membrane fuscous.

The 1st joint of the antennæ is a little longer than the head, 2nd more than half the length of the 1st, remainder mutilated. The anterior lobe of the pronotum is deeply bilobed by a longitudinal central incision. The third abdominal segment is the most amply dilated. Hind femora more slender than anterior or intermediate.

Long. 30 mill.

Fianarantsoa.

*Ulpus obscurus*, n. sp. (Pl. V. fig. 4, 4a.)

Black. Antennæ with 1st joint black, slightly shorter than head and pronotum together, 2nd and 3rd joints luteous, slightly and narrowly black at base. Pronotum with two large subconical tubercles at base of posterior lobe, which are strongly pilose in front; a deep, central broad longitudinal fovea, extending through disc of anterior and posterior lobes. The base of the pronotum and posterior sides of tubercles dull, luteous; lateral angles subprominent. Scutellum black, corium much suffused with luteous; membrane fuscous, paler at base. Dilated portion of abdomen above streaked and shaded with castaneous, and obscurely spotted with same colour beneath. Underside of body, legs and rostrum black.

The colour is shining, but the luteous markings vary in intensity in different specimens. Legs strongly pilose, the hairs arranged in tufts on femora. The dilated lateral borders of the posterior segments of the abdomen are broadly produced upwards.

Long. 19 mill.

Fianarantsoa.

*Ulpinus bicolor*, n. sp.

Head luteous, with a basal streak behind eyes, and an apical streak in front of antenniferous tubercles, black. Rostrum black, with 1st joint and base of 2nd luteous. Pronotum with the anterior lobe black, posterior luteous, with two large raised tubercles at base. Scutellum black. Corium luteous, with apical angle and membrane fuscous. Dilated portion of abdominal segments above and below castaneous. Abdomen beneath and legs black; coxæ, apices of femora and bases of tibiæ luteous.

Antennæ with 1st and 2nd joints black, remainder fuscous. The pronotum has a deep, broad central longitudinal fovea on disc of anterior and posterior lobes; the lateral angles are slightly prominent. Legs strongly pilose, hairs arranged in tufts on femora. Apex of membrane pale, obscure, hyaline.

Long. 19 mill.

Fianarantsoa.

*Ulpinus festivus*, n. sp.

Head luteous, post-ocular portion above black. Antennæ black, antenniferous tubercles luteous. Rostrum with basal joint luteous, remainder black. Posterior lobe of pronotum and corium reddish. Membrane, abdomen and legs black; the coxæ, apices of femora and bases of tibiæ are luteous, the mesosternum is also of the same colour. The membrane is bluish-black, with the apex fuscous hyaline.

Long. 16 mill.

Antananarivo.

Closely allied to the preceding, but smaller, the femora much less nodulated, the pronotal tubercles somewhat smaller and more obtuse. The colour of the antennæ, of the dilation of the abdominal segments, and general hue above is different.

*Enithares maculata*, n. sp. (Pl. V. fig. 7.)

Pale, obscure, luteous, with the following fuscous


macular markings, viz., a median transverse fascia on disc of pronotum, two large somewhat rounded spots at base of scutellum, a small spot on each clavus at apex, and a larger spot on margin of each corium near apex. Membrane obscure creamy-white. Abdomen beneath pitchy, median carina dull luteous. Legs luteous, tibiae outwardly punctured with black.

Long. 14 to 17 mill. Max. lat.  $6\frac{1}{2}$  to  $7\frac{1}{3}$  mill.

Antananarivo.

The macular markings from an examination of a long series are very constant, but differ in one specimen by having the spot on margin of corium dilated into a triangular patch which quite reaches apex, and in one other specimen all the markings are exceedingly indistinct. It is at once separated from the other Madagascarene species, *E. blandula*, Sign., by the macular markings and its much greater size.

*Platycleura Madagascariensis*, n. sp. (Pl. V. fig. 9, 9a.)

Head, pronotum, mesonotum, metanotum and tegmina very closely resembling in marking and colour *P. guttulata* of Sign. Wings also somewhat resembling that species, but darker castaneous, with a broad submarginal band and apical third dark fuscous, the last sometimes containing some pale linear streaks; outer margin pale obscure whitish. The face is greenish-ochreous, broad, deeply and transversely sulcated, with a black, central longitudinal impression widened in the middle to a deep fovea. Abdomen above black, discs of first, second, and third segments with fulvous -shaped markings. Prosternum and mesosternum greenish-ochreous, with the submarginal borders and some central markings black. Metasternum black, with the basal margin pale luteous. Drums greenish-ochreous, broadly margined with black. Abdomen beneath greenish-ochreous, with the lateral and transverse segmental margins black. Legs pale castaneous, bases of tibiae and undersides of fore femora black. Rostrum greenish-ochreous, apical joint fuscous, almost reaching first abdominal segment.

♂. Long. 28 mill. ; exp. tegm. 92 mill.

Tamatave.

This species, though in general appearance and coloration closely allied to *P. guttulata* of Sign., is yet easily

separable and structurally very distinct. Besides its larger and more robust form the following are the *differentia specifica*.

Abdomen above fulvous.

Drums slightly overlapping and unicolorous.

Rostrum reaching posterior coxæ. *P. guttulata*, Sign. ♂.

Abdomen above black.

Drums not overlapping and margined with black.

Rostrum about reaching first abdominal segment. *P. Madagascariensis*, Dist.



XV. *On some unusual monstrous Insects.* By J. O. WESTWOOD, M.A., F.L.S., &c.

[Read June 4th, 1879.]

(Plates VI. and VII.)

A. INSECTS WITH EXTRA DEVELOPMENT OF WINGS.

IN the various classifications of monstrous or abnormal productions of Nature which have been proposed by physiologists, a large and important division has comprised those individuals which possessed more than the ordinary structures of the type of the species. To such individuals the name of "Monstra per excessum" has been applied. By M. Lacordaire they were termed "Monstres polyméliens," from which the term of *Polymelianism* may be applied, to distinguish this form of monstrosity. Among the articulated animals (to which the name of *Arthropoda* is now applied) this kind of monstrosity is of comparatively moderate extent. In fact, no specimen has hitherto been described in which more than a single head or a single body has been found in the individual monster, the monstrosity being confined to an extra number of legs and antennæ, or joints of those organs. Of both of these abnormalities the number of instances has been considerable, but additional wings or portions of wings are of such rare occurrence that no such instance is recorded by Lacordaire or other writers on Entomology.\*

From this circumstance it may be inferred that there is a greater analogy between the legs and antennæ of an

\* M. Isidore Geoffroy Saint Hilaire divides Polymelian monsters into five genera: 1, *Pygomélians* (where the additional members are affixed to the pelvic region); † 2, *Gastromélians* (to the belly); 3, *Notomélians* (to the back); 4, *Cephalomélians* (to the head), and *Melomélians* (to the other members). "Tous les cas observés jusqu'à ce jour, parmi les insectes appartiennent à la Mélomélie et l'on en connaît déjà un assez grand nombre, qui tous portent sur les antennes et les pattes." Lacordaire, Introduction ii. p. 444.

† M. Lacordaire considers the statement of Paulin, "Ephemer. des Curieux de la Nature," Dec. iii. Ann. iii. p. 316, that he had observed a fly which had a third wing implanted on the podex, as unworthy of credit.

Arthropod than between those organs and the wings, and this, we know, is physiologically the case. Still, however, the instances which I am able to produce in this communication prove that the principle of extra development is as applicable to the wings as to the other limbs of insects.

The first specimen I have to describe is a *Gonepteryx Rhamni* (Pl. VI. fig. 1), which possesses an extra imperfectly-developed hind wing. It was taken by Mr. J. Woodgate, of Richmond Road, New Barnet, Herts. Looked at from above, the left hind wing is evidently broader than the right; in fact, the right-hand true wing is scarcely more than two-thirds of the normal size. In fig. 1*a* this double right-hand hind wing is represented from above, and in fig. 1*b*, from beneath. From both points of view it is evident that the normal anterior margin of the wing, indicated by the costal vein, *a*, properly developed, is shown in the supplemental wing in fig. 1*b*, *a*, whereas in fig. 1*a* the costal part of the true wing, with its costal vein, *a*<sup>\*</sup>, is imperfectly developed; the postcostal vein, with its two branches, *b*<sup>1</sup> and *b*<sup>2</sup>, are normally arranged in the true wing, as are also the discoidal vein, *c*, and the median vein and its three branches, *d*<sup>1</sup>, *d*<sup>2</sup> and *d*<sup>3</sup>. In the supplemental wing (fig. 1*b*) the veins, except the costal one, are more or less abnormal; the subcostal, *b*, has only one branch, if we except a very slight indication of bifurcation close to its extremity; the discoidal vein, *c*, is, in like manner, imperfectly bifurcate at its extremity, which does not reach the outer margin of the wing, and the median vein, *d*, has only one branch, and is connected with the subcostal vein by two oblique discocellular veinlets closing the cell, and it is upon these veinlets that the characteristic orange patch, seen both on the normal and supplemental wing, is seen. From this description I think we are warranted in concluding that the true wing has been sacrificed, and that in the supplemental wing nearly the whole (except the costal portion) has been partially aborted. In the specimen only two legs exist on the side of the monstrous wings, but I was not able to examine it sufficiently, for fear of injury, to determine whether a third leg had been broken off. If not, could the extra wing have replaced the wanting leg?

The second specimen to be here noticed is a *Vanessa Urticae* (Pl. VI. fig. 2), which was in the collection of the late J. F. Stephens, and of which I published a figure in my

“Butterflies of Great Britain, 1855,” pl. vii. fig. 1. It was captured by Mr. Doubleday at Epping, and is now in the British Museum. The supplemental wing is here, as in the former specimen affixed at the base of the costal portion of the right hind wing, but here it is implanted on the upper side of the wing, and consequently hides the outer costal and postcostal portion of the true wing when seen from above; whereas in *G. Rhamni*, it is affixed on the under surface of the wing, and is therefore partially hidden by the costal portion of the true wing when seen from above. The supplemental wing is here much less developed than in the former case as shown in figure 2*b*, where the costal vein *a* is not fully developed, the subcostal vein *b* is destitute of its branch, the discoidal vein is entirely wanting, but the median vein has its three branches, *d*<sup>1</sup>, *d*<sup>2</sup> and *d*<sup>3</sup>, the last two, however, being united together previous to arriving at the hind margin of the wing, where in the true wing the most prominent point of the margin is produced.

The third specimen here represented (Pl. VI. fig. 3) is a male *Hipparchia Janira*, taken last year near Oxford, and now in the Hopeian Entomological Museum. On the upper side there is no apparent monstrosity, the uniform brown colour of the wings not allowing any irregularity to be observed. On the underside the case is different, as we here perceive on the left-hand hind wing an orange streak with a moderately-large eyelet let in between the subcostal and median portions of the wing, of which there is no trace in the right-hand hind wing, and on carefully examining the veins it is found that there is one vein which does not normally exist as shown in fig. 3*a* (the abnormal) and 3*b*, the normal wing; moreover, it is upon this extra vein and its neighbourhood that the fulvous colour and the extra eyelet is found; and as in no varieties of the male of this species are the hind wings orange coloured, we are led to the inevitable conclusion that this left-hand hind wing has been supplemented by that precise portion of an additional fore-wing which bears the discoidal veins and the large eyelet near the tip of the normal fore-wings.

#### B. INSECTS WITH IMPERFECTLY-DEVELOPED HEADS.

The other cases of insect monstrosity which I propose to bring before the notice of the Society are those in which the perfect insect retains some portion of the outer

covering of the larva, the pupa not having had sufficient strength entirely to get rid of the larva skin, so that the perfect insect has its head, for instance, enveloped not only in the cephalotheca of the pupa but also in that of the larva. This form of monstrosity constitutes all Lacordaire's fifth division "Monstres par arrêt de développement" (Introd. ii. p. 441), of which he was only acquainted with two instances (p. 442), viz., Mueller's *Phalæna Heteroclitæ* and Wesmæel's *Nymphalis Populi*, noticed below.

#### COLEOPTERA.

CYBISTER LIMBATUS.—A specimen of this water beetle was captured by Mr. J. C. Bowring, swimming in water at Hong Kong, having the head of the imago replaced by that of the larva. The specimen is represented in Pl. VII. figs. 1 and 1a. It is noticed by Mr. F. Smith, "Proc. Ent. Soc. Lond.," ser. 2, vol. iv. p. 34, and by myself as a species of *Dytiscus* in the "Entomol. Monthly Mag.," No. 82, p. 239. The specimen is now in the British Museum. The anterior part of the head of the larva is broken off, but the very narrow neck has prevented the development of the widened jugulum of the imago.

HYDATIUS BIMARGINATUS.—Dr. John L. Leconte informed me that a specimen of this beetle retaining the head of the larva is in the collection of Dr. Helmuth, of Chicago.

CALYPTOCEPHALUS FASCIATUS (G. R. Gray, in Griff. Ass. K. Ins., pl. xxxix. f. 5).—Pl. VII. fig. 2 represents a specimen of this Brazilian species of *Malacoderms* which has not had sufficient strength to throw off the prothoracotheca of the pupa, which still remains as a large white regular-shaped scale concealing the head and prothorax when seen from above. Fig. 2a shows the lateral view of the anterior part of the body, showing the prothorax disengaged except at its anterior part.

#### LEPIDOPTERA.

GASTROPACHA QUERCIFOLIA.—A specimen of this moth, having the head entirely enveloped in the cephalotheca of

the larva, is represented in Pl. VII. fig. 6. It was in the collection of the late J. F. Stephens, and is now preserved in the British Museum.

**BOMBYX MORI.**—A small specimen of this species was exhibited by Mr. F. Bond at the Entomological Society of London, February 20, 1871, retaining the larval head. It has been presented to me by Mr. Bond, and is now in the Hopeian Entomological Museum at Oxford. It is represented, enlarged in Pl. VII. fig. 5. It has the wings crippled, but the head is entirely enveloped in the head of the larva as represented in fig. 5*a*, front view, fig. 5*b* seen sideways, showing the minute eyes of the larva.

**VANESSA ATALANTA.**—Pl. VII. fig. 4 represents the front of the body and head of a specimen of the Red Admiral butterfly which still retained the fractured cephalotheca of the larva covered with its minute conical tubercles, and which are represented as seen sideways in fig. 4*a*. The specimen was bred by a metropolitan collector, and was very perfect. It was lent to me for delineation by Mr. F. Bond, by whom it was exhibited at the Entomological Society of London on the 6th February, 1871. It was a male, as shown by the feathery anterior legs in fig. 4*a*. The hind part of the larval head was split, and partly lost. On looking obliquely through this slit at the point \*, the light is seen through it, proving that the inclosed head of the animal did not occupy the anterior part of the skull of the caterpillar beyond the \*. The inclosed portion which has oozed through the slit in the larval skull forms a convex hard mass of a blackish colour, tessellated with small luteous dots and marks, and which appears to me to be the skull of the true pupa. On the underside there are no traces visible of the antennæ cases (*ceratothecæ*), but a shapeless blackish mass is interposed between the skull of the larva and the front of the chest and fore-legs of the imago.

In an elaborate memoir, published by Dr. Hermann A. Hagen in the 2nd volume of the 'Memoirs of the Museum of Comparative Zoology' at Harvard College, Cambridge, Mass., on some insect deformities, the following instances

of perfect *Lepidopterous insects with the larval head* are described:—

PHALÆNA HETEROCLITA SUBCRISTATA of O. F. Mueller, Faun. Fredrichsalen, p. 47, and in the Mém. de Mathém. et de Phys. Acad. R. Sciences Par 1774, vol. vi. pp. 508—511, pl. 1. This insect (regarded by Mueller as a distinct species, by Hagen, Bibl. Ent. i. 556, as *Bombyx dispar*, by myself as one of the *Noctuidæ*, Introd. ii. p. 356, and by Lacordaire as a *Noctuelle*, Introd. ii. p. 442) appears rather to be a specimen of *Bombyx Psilura monacha*, as quoted by Werneburg, Beitr. z. Schm. i. 376, and cited by Hagen, p. 6.

Mueller gives a precise description of the head of his specimen, which was entirely enveloped in that of the larva, which he says consisted of “une membrane mince, qui a l'aide d'une loupe, laissait entrevoir une liqueur transparente agitée d'un mouvement continué.” The moth lived ten days, thus enabling its captor to observe this movement, which he repeats a second time: “On voit clairement le mouvement peristaltique de la liqueur sous la membrane triangulaire aussi bien que le mouvement des organes de la bouche,” thus proving, as Dr. Hagen suggests, that “the insect must have been an imago with the head of the caterpillar preserved; not only with the skin covering the head of the imago preserved, but with a real head of the caterpillar, in which the circulation of the blood was still taking place and the maxillary organs were still moveable, a condition of the parts contrary to all our present knowledge of the anatomy and development of insects.

NYMPHALIS POPULI.—The late Professor Wesmael, of Brussels, captured a specimen of this species near that city, of which he published an account and figure in the Bull. Acad. Bruxelles, 1838, tom. iv. p. 359, with a coloured figure of the insect reproduced in Ann. Sci. Nat. ser. 2, vol. viii. p. 191, and Hagen, *ut supra*, p. 8, and plate, figs. 10, 11. The specimen was fully developed, except that the head was still entirely enveloped in the bicornuted cephalotheca of the larva, which the butterfly ineffectually endeavoured to get rid of by a quick motion of the fore-legs, trying to push it off. In dissecting the left side of the head, Prof. Wesmael discovered underneath the external skin a second one, much thinner than the outer, and beneath the second one the well-developed eye

of the imago ; and underneath the head of the caterpillar, and just above the skin of the chrysalis was the left antennæ coiled up, but without an apical knob,—it was covered by a very fine membrane, to a great extent diaphanous.

**MORPHO EURYLOCIUS.**—I am indebted to Dr. H. A. Hagen for the very beautiful drawing of a specimen of this butterfly (reduced to half its natural size, copied in Pl. VII. fig. 3), of which a full-sized figure and description were published by him in his article in the Harvard College Memoirs above referred to.

In this specimen the cornuted head of the larva is perfectly preserved in shape and colour ; beneath the head the mentum is broken off near the prothorax, its lateral sutures are separated and the mentum hangs down as a kind of trap-door, being united with the head only by a small anterior lobe. The opening is large enough to show that the head of the larva is empty inside. The skin between the head and prothorax is still preserved in the shape of a contracted ring, which is open only for a small space beneath where the mentum is separated. The large dorsal plate of the prothorax is present and covers loosely the thorax of the imago, on the left side the external third is wanting. Dr. Hagen was not able to state whether any part of the skin of the chrysalis, either beneath the dorsal plate of the prothorax on the middle and on the right or on the entirely free left side of the thorax is present.

**VANESSA ANTIOPA.**—Professor Zeller has described in the *Isis*, 1839, p. 259, a specimen of this butterfly retaining the head of the caterpillar in the usual vertical position. Having cut off a part of the left side a hollow space between the head of the caterpillar and the remaining parts of the insect was noticed ; behind the head, and not connected with it, the two anterior plates of the chrysalis are retained.

**PIERIS RAPÆ.**—A chrysalis of this species is described by Dr. Hagen, p. 10, in which, in casting off the skin of the caterpillar, only the thoracic part of the chrysalis was developed, the head of the caterpillar was still present, but its sutures were separated. The dorsal split of the skin reaches to the first segment of the abdomen, and the

skin of the abdomen is retracted, but still present. A similar specimen has also been observed by Mr. S. H. Scudder.

*ZYGÆNA EXULANS*, var. *Vanadis*.—Dr. Staudinger (Stettin. Ent. Zeit. 1861, xxii. p. 359), describes a larval-headed male of this species. The mouth parts of the larva were immovable in the living insect, the head was fastened to the prothorax, and moved only by the motion of the latter, which was fully developed beneath with its legs. Dr. Staudinger believed it impossible that the head of the imago was enclosed in this larval head.

*SMERINTHUS TILLÆ*.—Prof. Van der Hoeven, Tijdschr. v. Natur. Gesch. vii. p. 279, mentions a caterpillar of this species which had not been able to cast off in the last moult the skin covering of the spine of the tail.

*SPIIINX*, sp.—Dr. Hagen, op. cit. p. 11, mentions a sphinx captured by M. Trouvelot, having the head of the caterpillar.

*BOMBYX MORI*.—In the Tijdschrift voor Nat. Gesch. 1840, vol. vii. pp. 257—270, pl. 1, an interesting series of observations are published by J. J. Bruinsma, on chrysalids of the common silkworm, which had been taken out of the cocoon, having the upper part of the larval skin still remaining; one of which was subsequently transformed into a moth with the caterpillar head still remaining, the head of the caterpillar covering exactly the place where the head of the moth should be, so that nothing was to be seen of it, nor of its antennæ or eyes. The right part of the head was taken off, and beneath it the right antennæ was discovered, well formed, but coiled up. In taking off more of the skin, a well-formed eye of the perfect insect appeared. Several other chrysalids of the silk moth were also described and figured, retaining the head of the larvæ. Other specimens of the silk moths retaining the head of the larvæ (observed by Mr. Eindhoven) were described in a supplemental note by Van der Hoeven, who also drew attention to a memoir by J. Jonston, in his Hist. Nat. de Insectis, Amstel. 1657, p. 123, and 1768, p. 176, concerning a male and female *B. mori*. In both the head of the larva was retained, covering the well-developed head of the imago.



ZERENE ADUSTA.—Dr. Hagen, op. cit. p. 13, records the transformation of a caterpillar of this species into a chrysalis which still retained the head of the larva.

BOTYS FUSCALIS.—Mr. Stainton exhibited to the Entomological Society of London a specimen of this moth with the head covered by part of the puparium; it was flying briskly when captured, the antennæ and haustellum were free, and the case of the latter projected downwards, like the rostrum of a *Panorpa*.

The deductions of Dr. Hagen, arising from the consideration of the preceding cases, are of considerable physiological importance, to which, however, I have not considered it necessary in this place to do more than allude thus briefly.

PSYCHODA AURICULATA.—Mr. Curtis (Brit. Ent. pl. 745) has represented in his figures of the genus *Psychoda* certain biarticulate appendages, two of which are attached to the anterior margin of the thorax of certain individuals of that genus. They seem to represent two biarticulated palpi, and were pointed out to him by Mr. Haliday. "They seem," says Mr. Curtis, "to be the analogues of those developed in the pupæ (as figured by Bouché, pl. 2, fig. 22), and it may be by accident that they are united to the prothorax or absorbed in their change to the imago, otherwise it would be difficult to explain the reason why they are not common to the genus."

From this circumstance Mr. Haliday named one species of the genus *Psychoda auriculata*.

The following case of the accelerated development of the imago is referred to by Lacordaire amongst his instances of imperfect Ecdysis, resulting from "précocité de développement" (op. cit. p. 443):—

According to Majoli (Giornale di fisica del regno italico, Pavia, 1803, t. v. p. 399, cited in Meckel's Deutsches Archiv. für Physiologie. t. ii. p. 542, not quite correctly by Lacordaire, Introd. ii. p. 443, and by Dr. Hagen, from the original in Mem. Mus. Compar. Anat. Harvard Coll. t. ii. No. 9, 1876), the caterpillars of *Bombyx mori* are occasionally transformed after their fourth moulting without

spinning any cocoon. The perfect moths which are produced from these individuals exhibit a curious mixture of the parts of the imago and those of the larva; the head being small, furnished with two black compound eyes, the thorax is incomplete, having the third segment similar to the third ring of the larva; the abdomen also resembles that of the larva after its fourth moult both in form and the number of its segments. The hind wings are long and narrow, and the antennæ are greyish coloured, the fore-wings somewhat elongated and narrow, and the hind wings shorter and narrower (le ali superiori alquanto lunghe e ristrette, le inferiori più corte e strette). The cause of this irregular transformation is supposed by Majoli to be an excessive warm temperature in the breeding room, which prevents the caterpillar from producing the exudation of the fluids necessary for the formation of the chrysalis and obliges it to transform directly into the moth.

A somewhat similar instance of irregular development in a moth (*Orgyia antiqua* ?) was exhibited at the November Meeting of the Entomological Society, in which the larva skin had only been partially shed, whilst other parts of the insect had assumed the imago state, and others showed the pupa skin.

#### DIPTERA.

**ERISTALIS TENAX.**—This specimen (Pl. VII. fig. 7), which is in the Hopeian Collection, is remarkable at first sight for the two frontal horns or processes arising from a transverse portion of the head-case of the larva, which is one of the rat-tailed species found in manure water. The head itself of the imago is distinct; but, as shown in figs. 7*a* and 7*b*, it is enveloped in the delicate pellicle or cephalotheca of the pupa.

**ERISTALIS NEMORUM.**—This specimen, the head of which is represented in fig. 8, is also in the Hopeian Collection, to which it was presented by Sir Sidney Saunders, agrees with the preceding in having retained the head-case and two elongated appendages of the larva on assuming the imago state.

XVI. *Observations sur les Lépidoptères des îles Sangir, et descriptions de quelques espèces nouvelles.* Par C. OBERTHÜR.

[Read September 3rd, 1879.]

(Plate VIII.)

I. *Papilio Sangira*, Oberthür. (Pl. VIII. fig. 1.)

Le *Papilio Sangira* se place à côté du *Papilio Telephus*, Wallace (*Papilionidæ* of the Malayan region, pl. 7, fig. 4).

Il en diffère par sa taille plus petite, et aussi parce que les taches qui traversent l'aile inférieure, et forment dans *Telephus* une bande maculaire *non interrompue*, sont tout-à-fait *séparées* et très réduites dans *Sangira*.

En dessous, les différences du dessus sont reproduites. De plus les taches *rouges* dans *Telephus* sont *jaunes* dans *Sangira*.

L'abdomen de *Sangira* est exactement comme celui d'*Eurypilus*; c'est-à-dire, noir en dessus, avec une bande latérale blanche, puis une autre noire, et enfin blanc en dessous. L'abdomen de *Telephus* est blanc en dessus et en dessous avec une bande noire latérale.

II. *Papilio Krusensternii*, Eschscholtz.

Cette magnifique espèce, dont la ♀ a été appelée *Rumanzovia* par Eschscholtz (Kotzebue Reise, pl. 2, fig. 4, *a, b*), et *Descombesi* par le Dr. Boisduval (*Species général*, p. 197), est à Sangir d'une très grande taille et parée de vives couleurs.

La ♀ varie beaucoup pour l'extension ou l'oblitération des parties carminées en dessus. Certains exemplaires ont une belle tache carminée à la base des ailes supérieures, où les nervures la divisent en 2 ou 3 parties; puis aux ailes inférieures on voit une large tache rose à l'angle anal et une série à peu près complète de grosses taches roses intrà-nervurales.

Dans d'autres exemplaires, au contraire, les parties noires recouvrent le carminé à la base de l'aile supérieure, et réduisent beaucoup le rose aux ailes inférieures.

Je possède le *Descombesi* type de Boisduval, provenant de Manille. Il est plus petit et moins puissamment développé qu'à Sangir.

### III. *Idæa Godmani*, Oberthür.

Diffère de *Leuconoë*, dont elle est une magnifique forme géographique très constante et très caractérisée, par la réduction des taches noires, qui dans *Godmani* sont fort rétrécies et dont quelques-unes sont oblitérées; et surtout est bien distincte du type *Leuconoë* de Manille par la teinte blanc-de-lait de ses 4 ailes. Un très faible lavis jaunâtre se remarque, cependant, à la base des ailes de l'*Idæa Godmani*; dans *Leuconoë* type, ce lavis jaune pénètre jusqu'au delà du milieu même de l'aile supérieure et est fort accentué.

J'ai dû désigner par un nom cette superbe variété géographique, plus importante même que la variété d'*Urvillei* d'*Azea*, Boisduval; et j'ai été heureux de dédier cette *Idæa* à l'éminent entomologiste Anglais dont les travaux scientifiques sont justement appréciés et les collections si célèbres.

### IV. *Euplæa Depuiseti*, Oberthür. (Pl. VIII. fig. 2.)

Se place près de *Kadu*, Eschscholtz; plus grande que cette espèce; le fond des ailes noir avec un reflet central bleu foncé brillant, décoré de 2 bandes parallèles au bord extérieur de taches bleu-clair très brillantes, avec l'extrémité ou le centre blanc. Ces 2 bandes à l'aile supérieure sont formées de taches pour le bande *extérieure* d'abord presque contigües, assez larges, puis intrà-nervurales et plus petites; et pour la bande *intérieure* d'abord voisines les unes des autres, sagittées et séparées par un espace sans tache des 2 inférieures, dont la dernière beaucoup plus grosse, le supérieure très réduite, quelquefois absente dans le ♂.

À l'aile inférieure, le ♂ porte une grande tache brun-clair, finement soyeux, et commune à ce sexe dans beaucoup d'espèces congénères. Les 2 rangées de taches bleues, plus petites dans le ♂ que dans la ♀, sont la reproduction de celles du dessous, dont elles transparaissent.

Dessous d'un brun profond, avec reflet bleu chatoyant reproduisant en blanc, sur lequel se joue un reflet bleuâtre, les taches du dessus. Ces taches sont plus petites et plus arrondies en dessous qu'en dessus.

De plus à l'aile supérieure en dessous, on remarque une bande de taches intrà-nervurales placées 2 à 2 très près et le long du bord extérieur. Cette bande n'existe en dessus que par transparence.

J'ai dédié cette belle *Euplœa*, une des plus remarquables du genre assurément, comme témoignage de mon amitié cordiale à M. Depuiset, naturaliste à Paris.

V. *Limenitis Bruijni*, Oberthür. (Pl. VIII. fig. 3.)

Taille de *Camilla*; noire en dessus avec 4 taches blanches à l'aile supérieure et une rangée maculaire blanche intrà-nervurale, droite, assez près de la base et faisant suite aux 4 taches de l'aile supérieure lesquelles sont placées 2 à 2 et représentent une bande interrompue. À l'aile supérieure, on remarque 2 éclaircies longitudinales, un peu ondulées brun-clair, entre lesquelles sont 3 longues et étroites petites taches blanchâtres; à l'aile inférieure 3 rangées maculaires brun-clair assez régulièrement espacées sont parallèles au bord extérieur.

En dessous les ailes sont agréablement variées de noir, brun-clair, blanc et fauve. Aux supérieures on voit un trait large blanc longitudinal dans l'intérieur de la cellule discoïdale, puis les 4 taches blanches du dessus sont reproduites, ainsi que les bandes claires qui en dessous sont extérieurement marquées de blanc. Au milieu on distingue 5 taches blanches, dont 4 se confondent souvent en 2, traversées au milieu par le trait médian-nervural et joignant le bord extérieur.

Aux inférieures, on compte parallèlement à la frange et en commençant par le bord extérieur, une bande brune, une blanche, une brune, une blanche, une noire, une fauve, une noire, une blanche joignant, près l'angle anal la 4<sup>e</sup> blanche, enfin une plus large, irrégulière, noirâtre, surmontée d'un peu de fauve et joignant la 3<sup>e</sup> brune, encore une blanche joignant le long du bord anal la 2<sup>e</sup> blanche et pour finir, près de la base, une brune que surmonte un croissant blanc.

Dédiée à M. A. A. Bruijn, ancien officier de la marine hollandaise, naturaliste zélé et à qui la science doit les plus précieux renseignements sur le faune des régions papoue et malaise. M. Bruijn profite du commerce important qu'il entretient par ses navires avec les îles de l'Océanie, pour faire récolter toutes espèces d'objets d'histoire naturelle et spécialement des insectes. Les ento-

mologistes ne sauraient porter assez de reconnaissance au savant distingué qu'anime une ardeur aussi éclairée pour le progrès des sciences.

#### VI. *Cyrestis Eximia*, Oberthür. (Pl. VIII. fig. 4.)

Très remarquable espèce ne ressemblant à aucune de celles qui sont jusqu'à présent connues. Ailes brun-fauve un peu rougeâtre en dessus avec l'apex des supérieures noirâtre marqué d'une petite tache blanche et séparé de la partie fauve de l'aile par une large tache blanche descendant de la côte aux  $\frac{2}{3}$  de l'aile. L'aile inférieure entièrement fauve avec un petit point blanchâtre, ou jaunâtre, au milieu du bord antérieur et à la tête extérieure d'une ligne noirâtre.

Une double ligne, au milieu de la quelle est un rang serré de lunules intrà-nervurales assez larges, fauves aux ailes inférieures, noirâtres aux supérieures, marquées centralement de noir, descend du haut de la côte de l'aile supérieure en dehors de la grande tache blanche, jusqu'à l'angle anal de l'inférieure. Dans l'avant dernière nervure, se trouve une solution de continuité de cette bande lunaire et la lunule est un peu au-dessous de la dernière anale et de l'antépénultième, au dessus d'un petit liséré bleuâtre quelquefois centralement marqué d'un petit croissant noir. Des bandes, généralement assez fines descendent de la côte vers le bas des ailes; quelques-unes sont arrêtées à la nervure inférieure de la cellule discoïdale; d'autres descendent dans l'aile inférieure. Une seule (celle qui est surmontée de la petite tache blanchâtre ou jaunâtre) naît de l'aile inférieure et n'est pas le prolongement de celles des supérieures. Le bord des ailes est suivi d'une double ligne noire centralement plus claire. À l'aile inférieure une double ligne noire centralement fauve coupe la cellule discoïdale; cette double ligne est entourée largement de fauve-brun pâle extérieurement limité de noirâtre. Ces limites noirâtres, comme l'entourage fauve-brun pâle, se prolongent du haut en bas de l'aile, en dessus et en dessous de la cellule.

Dans la cellule de l'aile supérieure, sont 2 doubles lignes noires centralement fauves, entourées de fauve brun pâle limité de noirâtre et séparées par un espace assez large fauve. Ces bandes, sauf 2, s'arrêtent à la nervure inférieure de la cellule discoïdale. Le dessous reproduit exactement le dessus, mais en beaucoup plus pâle.

L'arête du thorax et de l'abdomen est noire entre 2 lignes fauve pâle.

VII. *Diadema Lassinassa*, var. *gigas*, Oberthür.

Ne diffère des individus ordinaires que par une taille bien supérieure. 3 ♂ dépassent en grandeur les plus grandes ♀ de Queensland. À Célèbes, les Papillons sont généralement plus grands que dans les autres îles voisines; aux Sangir, qui forment un petit archipel au nord de Célèbes, la taille des Papillons semblerait encore augmentée, du moins pour *Papilio Krusensternia* et *Diadema Lassinassa*.

Rennes, Août, 1879.





XVII. *Descriptions of Phytophagous Coleoptera belonging to the families Chrysomelidæ and Galerucidæ, from Peru.* By JOSEPH S. BALY, F.L.S.

[Read October 1st, 1879.]

RECENTLY a small portion of the collection of *Phytophaga*, brought over by Mr. Thamm from Chanchamayo, Peru, fell into my hands. On examination, I found many interesting species, apparently new to science. The majority of these, with the addition of some others from the same part of the world, previously in my collection, are described in the present paper.—*September*, 1879.

TABLE OF SPECIES.

Doryphora anchoralis.	Stegnea (n. g.) nigripes.
"    Thammi.	Eugonia (n. g.) dimidiatipennis.
"    decipiens.	Longitarsus peruvianus.
Leptinotarsa Kirschi.	Asphæra Thammi.
Notozona Jausoni.	"    discofasciata.
Epitrix carinata.	"    limbifera.
Haltica facialis.	Ædionychis signifera.
Pelonia elegantula.	"    pulchra.
Nephrica basalis.	Monoplatys fulvus.
Cyclophysa (n. g.) albicornis.	Omotyphus Erichsoni.
Disonycha pulchella.	Oetogonotes limbatus.
"    Erichsoni.	Cerichrestus Thammi.
Lactica Jacobyi.	Diabrotica limbifera.
"    clypeata.	"    setifera.
"    peruviana.	Monocesta sublimbata.
Hermæophaga nitidissima.	"    approximata.
Trichaltica Thammi.	

*Doryphora anchoralis.*

Oblongo-ovata, convexa, nigra, nitida, pedibus nigro-æneis; capite thoraceque subopacis, obscure æneis, hoc tenuiter punctato; clytris flavo-fulvis, limbo inflexo punctisque numerosis, germinato-seriatis, ad latera et ad apicem confuse dispositis, nigris; suturâ postice fasciisque duabus extrorsum abbreviatis, unâ ante medium transversâ, alterâ pone medium obliquâ, viridi-æneis.

Long. 6 lin.

*Hab.*—Chanchamayo.

Head finely punctured, labrum picceous; antennæ nearly

half the length of the body, black. Thorax more than twice as broad as long; sides nearly straight and slightly diverging from the base to the middle, rounded anteriorly, converging towards the apex, all the angles mucronate; disk opaque, distinctly punctured, flattened and slightly excavated on either side, distinctly but not evenly punctured. Elytra broader than the thorax, regularly convex, flavo-fulvous, the inflexed limb black; disk impressed with numerous black spots, arranged in double rows on the anterior half of the inner disk, placed without order on the sides and apex; a metallic-green vitta, occupying the hinder half of the suture, and two concolorous fasciæ, the first before the middle, abbreviated long within the lateral margin, the second oblique, placed behind the middle, attached at its inner end to the sutural vitta, abbreviated externally, but approaching much nearer to the lateral border than the anterior one; mesosternal spine equal in length to the metasternum, slightly curved, very acute.

*Doryphora Thammi.*

Late ovata, convexa, nigra, nitida, supra æneo-nigra, subopaca, thorace quam longo fere triplo latiori, utrinque late depresso, disco vage, ad latera distincte punctato; clytris ante medium valde convexis, hinc ad apicem declivibus, profunde punctatis; utrinque vittâ latâ sublaterali, a humero fere ad apicem extensâ, basi oblique truncatâ, hinc ad apicem graduatim attenuatâ, flavâ ornatis.

Long. 6 lin.

*Hab.*—Chanchamayo.

Head sparingly punctured; thorax nearly three times as broad as long; sides parallel from the base to just beyond the middle, thence obliquely rounded to the apex, anterior and posterior angles mucronate; disk very finely punctured, broadly depressed on either side, where the punctures are rather coarser and more distinct. Elytra much broader than the thorax, subquadrate-rotundate, slightly narrowed towards the apex; above very convex, the highest part of their convexity being before the middle; (from the middle to the apex they are obliquely deflexed;) surface deeply impressed with coarse punctures, the interspaces between which are irregular, granulose, and obsoletely thickened; at the base on the suture is a nitidous space, the rest of the surface is subopaque; on each

elytron, close to the lateral margin, is a broad flavous vitta which extends from the shoulder nearly to the sutural angle; from its obliquely truncate base it gradually narrows to its apex. Mesosternal spine robust, acute, equal in length to the metasternum.

This insect, which is very similar in form to *D. histrio* and its allies, closely resembles in pattern and coloration certain species of *Mesomphalia* coming from the same part of the world; it also somewhat agrees, in the pattern of its elytra, with *D. insularis*, Jacoby, but its general form, broader thorax, and coarsely-punctured elytra, will separate it from that species.

### *Doryphora decipiens.*

Ovato-rotundata, convexa, nigra-ænea, nitida; antennis (basi exceptâ) nigris; thorace utrinque prope marginem excavato, remote tenuissime punctato; elytris regulariter punctato-striatis, vittâ intra suturam, alterâ submarginali apice coëuntibus, limboque basali inter has vittas fulvis.

Long. 4 lin.

*Hab.*—Chanchamayo.

Head very minutely granulose, finely punctured, front impressed with a faint longitudinal groove; antennæ half the length of the body, black, the base piceous. Thorax more than twice as broad as long; sides straight and obliquely converging from the base to beyond the middle, thence rounded, and more quickly converging to the apex, the anterior angles acute; disk transversely convex, distinctly excavated on either side near the lateral margin, surface very minutely and remotely punctured. Elytra broader than the thorax, each impressed with two regular rows of punctures, the first short, their interspaces plane; the fourth and tenth interspaces, confluent at their apices, together with the basal limb between them, fulvous. Mesosternal spine shorter than the metasternum, robust, its apex obtuse.

### *Leptinotarsa Kirschi.*

Ovata, convexa, nigro-picea, nitida, capite thoraceque rufo-piceis, hoc disperse tenuiter punctato, antennis basi exceptâ, nigris; elytris regulariter punctato-striatis, flavis,

suturâ, margine exteriori, limbo inflexo et utriusque vittis quatuor nigris, cyaneo tinctis.

Long. 4 lin.

*Hab.*—Chanchamayo.

Head finely punctured; antennæ half the length of the body, the four lower joints obscure fulvous, stained with piceous, penultimate joint of maxillary palpus clavate, terminal one narrower than the preceding, truncate. Thorax more than twice as broad as long; sides straight and parallel, rounded and converging from before the middle to the apex, the anterior angles mucronate; disk transversely convex, distinctly punctured. Scutellum wedge-shaped, rufo-piceous. Elytra slightly broader than the thorax, subquadrate-ovate, convex, each impressed with ten longitudinal rows of punctures, the first short; interspaces obsoletely convex, sparingly impressed with very minute punctures; flavous, each with a sutural line, narrowed towards the apex, the outer margin, abbreviated at the extreme apex, the inflexed limb and four vittæ, the latter placed on each alternate interspace, black, tinged with cyaneous.

*Notozona Jansoni.*

Oblongo-ovata, valde convexa, pallide fulva, nitida, elytris tenuiter punctatis, cæruleo-nigris.

Long. 3½ lin.

*Hab.*—Peru.

Vertex shining, impunctate; encarpæ separated by a process of the front, bounded above and within by a broad groove; antennæ filiform, nearly equal to the body in length; eyes shining black. Thorax rather more than twice as broad as long; sides rounded, obliquely converging in front, the anterior angles slightly excurved, acute, the hinder ones rounded; disk impressed in front of the basal margin by an ill-defined transverse groove, finely punctured. Elytra ovate, convex, finely and somewhat closely punctured, bluish-black, with a faint metallic tint.

*Epitrix carinata.*

Ovata, valde convexa, nitida, subtus obscure picea, supra viridi-cyanea, pube subrectâ griscâ vestita, antennis (basi piceâ exceptâ) nigris; thorace distincte punctato, hic illic irregulariter crenulato, sulco basali recto; elytris

basi paullo elevatis, sat fortiter punctato-striatis, setis suberectis griseis vestitis.

Long.  $1\frac{1}{2}$  lin. = ♀. ♂.

Hab.—Peru.

Head rather longer than broad, trigonate; vertex finely rugose, front impressed on either side near the eye with a deep round foveolate puncture; interocular space separated from the front by a narrow, rather strongly raised, oblique line; carina linear, very strongly elevated, and forming a keel-like longitudinal ridge, which extends upwards to the front; encarpæ obsolete; antennæ more than half the length of the body, filiform, the second joint oval, equal in thickness to the basal one, equal in length to the third; the four lower joints piceous, the rest black. Thorax twice as broad as long; sides obliquely converging from the base towards the apex, the anterior angles thickened, broadly and very obliquely truncate, the hinder ones acute; basal margin sinuate on either side the medial lobe, the latter regularly rounded; disk convex, irregularly wrinkled, distinctly punctured; basal groove straight, entire. Scutellum small, semiovate-rotundate. Elytra oblong, convex, the humeral callus thickened, the basilar space on each elytron distinctly elevated; surface rather strongly punctate-striate, the interspaces smooth, clothed with long, suberect hairs.

### *Haltica facialis.*

Late ovata, valde convexa, nitida, subtus obscure nigro-anea, supra viridi metallica, antennis nigris; clypeo trigonato, utrinque triangulariter excavato, medio longitudinaliter carinato; thorace basi lobato, lateribus basi rectis, deinde ad apicem oblique rotundato-angustatis; disco lævi, sulco basali trisinuato; elytris infra basin leviter transversim excavatis, subseriatim punctatis.

Long. 2 lin.

Hab.—Chanchamayo.

Vertex shining, impunctate; front separated from the face by a deep groove; encarpæ transversely oblong-ovate, not contiguous; clypeus triangular, raised, its disk excavated, the excavation forming two large triangular rugose spaces, separated on the medial line by the strongly-raised linear carina; antennæ filiform, equal to the body in length. Thorax nearly twice as broad as long; sides straight and

parallel from the base to the middle, thence slightly rounded and narrowed towards the apex; the anterior angles very broadly and very obliquely truncate; the hinder angles produced, acute, basal margin rather strongly lobed; disk convex, shining, the basal sulcations trisinate, produced on either side to the lateral margin, the latter broad, its surface rugulose. Scutellum nigro-ræneous, trigonate, its apex obtuse. Elytra much broader than the thorax, subquadrate-ovate, attenuated at the apex; above very convex, slightly excavated on either side below the basilar space, finely but distinctly punctured.

*Pelonia elegantula.*

Anguste elongata, rufo-fulva, nitida, antennis, basi exceptis, tibiis tarsisque nigris; thorace subquadrato, lateribus paullo rotundatis, disco lævi; elytris elongatis, tenuiter punctatis, metallico-violaceis, utrisque limbo, basi excepto, rufo-fulvo.

Long. 2—2 $\frac{1}{4}$  lin.

*Hab.*—Chanchamayo.

Head not longer than broad, trigonate, eyes large, prominent, black; antennæ filiform, three-fourths the length of the body, the three lower joints rufo-fulvous, stained above and at the apex with piceous, the under-surface of the three upper joints also piceous. Thorax subquadrate; sides moderately rounded; all the angles produced, subacute; disk shining, impunctate. Elytra broader than the thorax, parallel on the sides, moderately convex, finely punctured.

*Nephrica basalis.*

Elongato-ovata, convexa, subtus cum capite piceo-fulva, antennis piceis; supra fulva nitida, scutello rufo-piceo, oculis profunde emarginatis; thorace minute punctato, sulco basali obsoleto; elytris subcrebre tenuiter punctatis, utrisque plagâ subquadrata transversâ, ad suturam anguste, ad marginem lateralem late abbreviatâ, piceâ ornatis.

Long. 3 $\frac{1}{2}$  lin.

*Hab.*—Peru.

Encarpæ well defined, thickened, contiguous; carina obsolete; clypeus impressed on either side with a deep

fovea, its anterior surface thickened; space between the antennæ also thickened; eyes deeply notched, the notch extending more than halfway across the disk; antennæ filiform, about half the length of the body, the 2nd joint short, the 3rd, 4th and 5th equal in length, each twice as long as the 2nd. Thorax twice as broad as long; sides slightly rounded and converging from the base towards the middle, the anterior angles slightly produced, thickened, obtuse; the hinder angles acute, produced slightly backwards; hinder margin obtusely truncate, obliquely sinuate on either side within the lateral angle; upper surface slightly flattened on the hinder disk, finely punctured; sides distinctly margined; on either side some little distance within the margin is a longitudinal groove, the space between which and the margin itself is thickened and forms a broad longitudinal elevation, the apex of which, just before reaching the anterior border of the thorax, curves for a short distance abruptly inwards on the disk. Elytra narrowly ovate, convex, finely punctured.

### Genus CYCLOPHYSA.

*Corpus* sub-rotundatum, valde convexum. *Caput* trigonatum; antennis filiformibus; *oculis* elongatis, reniformibus, intus profunde rotundato-emarginatis; *encarpis* contiguus; *clypeo* elevato, apice cuneiformi; *palpis* maxillaribus articulo penultimo incrassato, ultimo brevi, conico. *Thorax* transversus, basi bi-impressus, lateribus subrectis, angulis anticis oblique truncatis, margine basali utrinque bisinuato. *Elytra* confuse punctata; limbo inflexo horizontali, concavo. *Pedes* robusti, breves; *femoribus* posticis valde, anticis quatuor modice incrassatis; *tibiis* a basi ad apicem incrassatis, dorso late canaliculatis, anticis quatuor muticis, posticis spinâ validâ armatis; *tarsorum* posticorum articulo basali duobus sequentibus æquilongo. *Unguiculis* divaricatis, appendiculatis. *Prosternum* anguste oblongum, coxis anticis æquialtum. *Mesosternum* transverso-quadratum, apice emarginato.

In the deeply-emarginate eyes, and in many other characters, *Cyclophysa* agrees with *Nephrica*, v. Harold; but it differs so entirely in the form of the body, which closely resembles that of a *Sphæroderma*, that I do not hesitate to separate it from that genus.

*Cyclophysa albicornis.*

Subrotundata, valde convexa, flava, nitida, antennis (articulo basali excepto) albidis, articulis ultimis duobus infuscatis; thorace tenuiter suberebre punctato; elytris magis distincte confuse punctatis.

Long.  $3\frac{1}{2}$  lin.

*Hab.*—Peru.

Head trigonate, not longer than broad; front impressed on either side close to the eye with a single fovea; encarpæ subquadrate, contiguous; clypeus thickened, its apex wedge-shaped and running upwards between the antennæ as far as the anterior margin of the encarpæ; antennæ robust, filiform, nearly equal to the body in length, joints cylindrical, the second short, the third nearly twice its length, the fourth as long as the two preceding united; eyes elongate, their inner margin deeply rotundate-emarginate. Thorax nearly three times as broad as long; sides nearly straight, obliquely converging from the base towards the apex, the hinder angles acute, the anterior ones thickened, broadly and obliquely truncate; anterior margin moderately concave, faintly bisinuate; disk transversely convex, finely punctured (when seen under a strong lens very faintly wrinkled); on either side at the base, at some distance from the lateral margin, is a distinct depression, the outer edge of which is well defined and thickened, running obliquely upwards and inwards for a short distance on the disk. Elytra broader than the thorax, the shoulders broadly rounded; sides narrowly margined, slightly dilated before the middle, the inflexed limb concave, its outer edge produced downwards and slightly outwards; upper surface very convex, more strongly punctured than the thorax.

*Disonycha pulchella.*

Elongato-ovata, convexa, picca, nitida, abdomine sordide fulvo, thorace albedo; disco lacteo, orbitis internis clypeoque flavis; thorace transverso, lateribus rectis, obliquis, angulis anticis obtuse truncatis; disco lævi, utrinque basi foveolato; clytris tenuiter punctatis, metallico-violaceis, limbo exteriori lacteo; utrisque fasciâ vix pone medium maculisque tribus, duabus infra basin, transversim positis, primâ



magnâ, subovatâ, prope suturam, secundâ minori infra callum humerale tertiâque apicali flavis.

Long.  $3\frac{2}{3}$  lin.

Hab.—Peru.

Head subrotundate; vertex shining, impunctate, dark piceous; encarpæ subquadrate, oblique, contiguous at their inner angles; carina obsolete; eyes black, distinctly sinuate within; antennæ filiform, the 3rd joint twice the length of the 2nd; the eight lower joints piceous, the rest broken off. Thorax nearly three times as broad as long at the base; sides straight, slightly converging from base to apex; the anterior angles obtuse, the hinder ones acute; basal margin transversely truncate, obliquely truncate on either side near the outer angle; disk shining, impunctate, impressed on either side at the base with a large ill-defined fovea. Scutellum trigonate, its apex obtuse. Elytra narrowly ovate, not dilated posteriorly, convex, not depressed below the basilar space, finely punctured.

*Disonycha Erichsoni.*

Elongato-ovata, convexa, nigra, nitida, antennis basi piceis; thorace lævi, basi leviter transversim sulcato, angulis anticis sordide albidis; elytris tenuissime punctatis, fasciâ basali, secundâ prope medium tertiâque apicem versus, flavo-albis, his fasciis vix intra marginem lateralem abbreviatis.

Long.  $3\frac{1}{2}$  lin.

Hab.—Peru; Banks of Napo.

Vertex smooth, impunctate; front impressed on either side with a deep groove, which, after running along the upper half of the inner orbit of the eye, curves inwards to the carina; encarpæ obsolete; carina raised, linear, continuous with the front; eyes sinuate-emarginate; antennæ filiform, moderately robust, the 2nd joint short, two-thirds the length of the 1st; the 3rd nearly equal in length to the two preceding united. Thorax twice as broad as long; sides slightly converging and very slightly rounded from the base towards the apex, the anterior angles thickened, dirty white; the hinder angles armed with a fulvous tubercle; above shining, impunctate, impressed at the base with a shallow transverse groove, which extends nearly across the disk, and is more deeply impressed and more distinct at either end. Elytra broader than the

thorax, narrowly ovate, not dilated posteriorly, moderately convex, very finely punctured; shining black, each elytron with three yellowish-white faciæ, the first subbasal, its hinder border obliquely curving outwards and downwards from the suture towards the outer margin, the second placed across the middle, gradually narrowed towards the suture, and the third (the sides of which are nearly parallel), rather more than halfway between the middle and the apex.

*Lactica Jacobyi.*

Anguste ovata, convexa, rufo-fulva, nitida, antennis (basi exceptâ), scutello abdomineque nigris, pedibus flavis, piceo tinctis, pectore piceo; elytris tenuiter subcrebre punctatis, minute granulosis, viridi metallicis, limbo inflexo nigro.

Long. 2 lin.

*Hab.*—Chanchamayo.

Face trigonate; vertex and front subopaque, excavated on the sides; encarpæ obsolete; carina raised, ill defined; antennæ nearly equal to the body in length, the four lower joints obscure rufo-fulvous; the 2nd joint two-thirds the length of the 3rd; labrum black; apical joint of maxillary palpus very acute; eyes large, subelongate, sinuate within. Thorax nearly three times as broad as long at the base; sides straight, obliquely converging from the base to the apex, the anterior angles obliquely truncate, the hinder ones produced, obtuse; disk shining, closely covered with very minute striæ, only visible under a very deep lens; basal groove deeply impressed, its anterior margin sinuate. Scutellum large, not longer than broad, trigonate. Elytra broader than the thorax, ovate, convex, finely granulose, impressed, but not closely, with fine punctures. Legs pale yellow, the whole of the four anterior thighs, the apex of the hinder one, the apices of the tibiæ, together with the tarsi, pale piceous.

*Lactica clypeata.*

Elongato-ovata, convexa, fulva, nitida, subtus griseo-pubescentis; oculis, antennis, femoribus apice, tibiis tarsisque nigris; thorace transverso, lævi, sulco basali pro-

fundo; elytris thorace paullo latioribus, lateribus parallelis, modice convexis, lævibus.

Long.  $3\frac{1}{2}$  lin.

Hab.—Chanchamayo.

Head longer than broad, subcuneiform; vertex and front closely punctured on either side; eyes black, slightly sinuate within; encarpæ thickened, contiguous; clypeus wedge-shaped; carina elevated, linear; antennæ filiform, about three-fourths the length of the body, the 2nd joint short, the 3rd one-half longer than the 2nd, one-third shorter than the 4th; two lower joints piceous, the rest black. Thorax twice as broad as long at the base; sides obliquely converging and very slightly rounded from the base towards the middle, anterior angles broadly and somewhat obliquely truncate, slightly produced laterally into an acute tooth; basal margin feebly lobed, bisinuate on either side; disk nitidous, very minutely punctured (the punctures only visible under a deep lens), basal sulcation deep, entire. Elytra rather broader than the thorax, parallel on the sides; above moderately convex, slightly flattened along the suture, not excavated below the basilar space; nitidous, impressed with very minute punctures, even less distinct than those on the thorax.

The larger size, together with the form of the clypeus, will separate the above insect from similarly-coloured species.

#### *Lactica peruviana.*

Ovata, convexa, cyanea, nitida, pectore abdomineque nigro-piceis, antennis pedibusque pallide flavis; elytris tenuissime subremote punctatis, metallico-cæruleis.

Long.  $2\frac{1}{3}$  lin.

Hab.—Peru.

Face triangular; vertex and front shining, impunctate; encarpæ subrotundate, contiguous; carina broad, strongly elevated; antennæ four-fifths the length of the body, pale yellow, the three lower joints stained with piceous; extreme apex of terminal joint also piceous; eyes rotundate-ovate, slightly sinuate within. Thorax twice as broad as long; sides straight, slightly converging from the base towards the apex, the anterior angles broadly and obliquely truncate; disk shining, impunctate, basal groove deeply impressed, its middle portion dilated posteriorly. Seu-

tellum longer than broad, trigonate, dark metallic blue. Elytra broader than the thorax, convex, very minutely punctured, interspaces smooth and shining, impunctate.

*Hermæophaga nitidissima.*

Breviter ovata, valde convexa, nitida, piceo-nigra, pedibus fulvo-piceis, femoribus dorso nigro-piceis; supra cyaneo-viridis, nitidissima, antennis piceis basi fulvis; thorace quam longo fere dimidio latiori; lateribus rectis, parallelis, antice leviter sinuatis, angulis anticis acutis, extrorsum curvatis, disco lævi, tenuissime remote punctato; elytris convexis, infra basin leviter transversim excavatis, tenuiter seriatim punctatis.

Long.  $1\frac{1}{4}$  lin.

Hab.—Chanhamayo.

Head trigonate; vertex shining, impunctate; encarpæ thickened, contiguous, subquadrate; carina oblong, thickened, abruptly terminating on the clypeus; eyes prominent, rotundate-ovate, entire; labrum piceous; antennæ with the second joint ovate, nearly as stout and nearly as long as the first, the latter equal in length to the fourth, the three lower joints obscure fulvous. Thorax one-half broader than long; sides straight, parallel from the base to beyond the middle, thence very slightly sinuate to the apex; all the angles acute, the anterior ones produced distinctly outwards; basal margin faintly lobed in front of the scutellum, nearly straight on either side; disk convex, very minutely and sparingly punctured; basal sulcation broad, terminating on either side, some distance within the lateral margin. Scutellum trigonate, its apex obtuse. Elytra much broader than the thorax, subquadrate-ovate; above very convex, excavated transversely below the basilar space, very finely and rather distantly punctate-striate; interspaces nitidous, impunctate.

The above species has entirely the facies of a *Diphaulaca*; it has, however, the apices of the four anterior tibiæ each armed with a minute spine: in *Diphaulaca* these spines are absent. Although differing somewhat in habit (caused by the transverse depression below the base of the elytra), it agrees in all essential characters with *Hermæophaga*, and must be placed in that genus; the same remarks apply to *D. columbica* and some allied species described by von Harold from Columbia.

*Trichaltica Thammi.*

Ovata, convexa, rufo-fulva, nitida, oculis, antennis (basi piceâ exceptâ), abdomine, clytrorum dimidio postico, femoribus anticis quatuor apice, posticis fere totis, tibiis tarsisque nigris; thorace lævi, basi profunde transversim sulcato; clytris pube suberectâ griseâ vestitis, fortiter punctato-striatis; interspatiis convexis, ad latera subcostatis.

Long.  $2\frac{1}{3}$  lin.

Hab.—Peru.

Head trigonate; encarpæ well defined, contiguous, subrotundate; carina raised, linear; antennæ nearly equal to the body in length, filiform, the three lower joints piceous, the rest black. Thorax nearly twice as broad as long; sides straight and very slightly diverging from the base to the middle, thence obliquely converging and slightly rounded to the apex; the anterior angles thickened, obliquely truncate, the hinder ones produced into a short acute tooth; disk convex, smooth and shining, impressed just in front of the basal margin with a deep transverse groove, which abruptly terminates on either side, some distance within the lateral margin. Elytra broader than the thorax, convex, clothed with rather coarse, long, suberect griseous hairs; each clytron with ten rows of deep punctures, the first short; interspaces on the inner half of the anterior disk subconvex, distinctly convex on the hinder disk, those on the outer disk more strongly raised and subcostate.

So nearly allied in form and coloration to *Eugonia dimidiatipennis*, that for a time I placed it with that species.

## Genus STEGNEA.

*Corpus* ovatum, convexum. *Caput* exsertum; *encarpis* contiguis; *carinâ* elevatâ; antennis filiformibus; *oculis* integris; *palpis* maxillaribus articulo ultimo conico, acuto. *Thorax* transversus, margine basali leviter lobato; disco ad basin sulco profundo, utrinque longe intra marginem lateralem desinente, impresso. *Elytra* modice convexa, infra basin non depressa, punctato-striata. *Pedes* medioeres; *coxis* anticis ovatis, non elevatis; *femoribus* posticis incrassatis; *tibiis* anticis quatuor apice muticis; *tarsorum* posteriorum articulo basali sequentibus tribus æquilongo; *unguiculis* appendiculatis. *Prosternum* ad

coxas æquialtum, postice transversim dilatato, apice medio postice porrecto, dorso carinato, retrorsum ad metasterni apicem producto; *acetabulis* anticis integris; *mesosternum* apice concavo-emarginato, medio occulto. Allied to *Crepidodera*, separated by the unarmed apices of the four anterior tibiæ and by the form of the prosternum.

*Stegnea nigripes.*

Anguste ovata, convexa, fulva, nitida, pectore piceo tincto; pedibus antennisque (his basi femoribusque basi exceptis) nigris; thorace remote et minute punctato, sulco basali sat profunde impresso; elytris tenuiter punctato-striatis, striis fere penitus deletis; interstitiis tenuiter punctatis, prope latera subcostatis.

Long.  $1\frac{2}{3}$  lin.

*Hab.*—Chanchamayo.

Vertex shining, impunctate; encarpæ subtrigonate, contigous; carina narrowly hastate; antennæ rather more than half the length of the body, filiform, the four lower joints fulvous, the rest black; eyes entire, subrotundate, black. Thorax about one-half broader than long; sides straight and parallel from the base to beyond the middle, thence obliquely converging towards the apex, the anterior angles obtuse, the hinder ones acute; disk convex, very minutely punctured (the punctures only visible under a deep lens), basal groove deeply impressed. Elytra ovate, convex, not depressed below the basilar space, very finely punctate-striate, the striæ on the middle disk obsolete; interspaces finely punctured, thickened and subcostate below the humeral callus and on the lateral margin.

Genus EUGONIA.

*Corpus* ovatum, convexum. *Caput* exsertum, *facie* trigonatum; *carinâ* lineariformi; *encarpis* transversis, vix contiguis; *oculis* magnis, prominentibus; *antennis* filiformibus; *palpis* maxillaribus subfiliformibus, articulo ultimo acuto. *Thorax* transversus, lateribus rotundato-ampliatis; margine basali medio late transversim, utrinque oblique truncato; disco convexo, basi sulco transverso, utrinque paullo intra marginem abrupte desinente, impresso. *Scutellum* cuneiforme. *Elytra* modice convexa, punctato-striata. *Prosternum* medio angustatum, postice transversim dilatatum, *acetabulis* anticis clausis. *Pedes*

sat elongati; *coxis* anticis elevatis, subrotundatis; *femoribus* posticis leviter incrassatis; *tibiis* ad apicem obsolete canaliculatis, anticis quatuor muticis; *unguiculis* appendiculatis.

*Eugonia* ought to stand near *Crepidodera*; it may be separated from that genus by the unarmed apices of the four anterior tibiæ and by the slender hinder thighs.

*Eugonia dimidiatipennis.*

Ovata, modice convexa, rufo-fulva, nitida, oculis, antennis, abdomine pedibusque (femoribus anticis quatuor basi et infra, posticis basi, exceptis), nigris; thorace convexo, lævi, impunctato; elytris modice convexis, infra basin non depressis, punctato-striatis, striis ante medium uniseriatim, pone medium confuse biseriatim punctatis, striis prope apicem penitus confusis; subopacis, sordide rufo-fulvis, a medio ad apicem cæruleo-nigris.

Long. 2 lin.

*Hab.*—Chanchamayo.

Vertex shining, impunctate; encarpæ transverse, well defined, carina strongly elevated; antennæ filiform, three-fourths the length of the body, the basal joint rufo-fulvous, the rest black. Thorax twice as broad as long; sides rather broadly margined, rotundate-ampliate; basal margin transversely truncate, obliquely truncate on either side near the hinder angle; disk shining, impunctate, somewhat swollen, impressed transversely at the base by a deep sulcation, which terminates abruptly on either side just within the lateral margin. Elytra broader than the thorax, oblong-ovate, moderately convex, rather strongly punctate-striate on the anterior disk, the punctures (which are of equal depth and strength to the apex of the elytra) are arranged in a single row on each stria; posteriorly they become confused and form irregular double rows; at the apex the striæ themselves are confused and entirely lost; interspaces on the outer and hinder disk thickened and convex.

*Longitarsus peruvianus.*

Elongato-ovatus, fulvus, nitidus, capite nigro, antennis (basi flavâ exceptâ) scutello, pectore abdomineque piceis, pedibus flavis; thorace lateribus basi rectis, ante medium

oblique rotundato-angustatis, angulis anticis obtusis; clytris (sub lente) tenuissime punctatis.

Long. 1 lin.

*Hab.*—Chanchamayo.

Head trigonate; vertex and front nitidous, impressed on either side, near the eye, with deep punctures; encarpæ not distinctly separated from the front, oblong, contiguous; carina raised, linear; antennæ slender, filiform, nearly equal to the body in length, the 2nd joint nearly equal in thickness as the 1st, scarcely shorter than the 3rd, oval; the 4th to the 7th nearly equal, each more than one-fourth longer than the 3rd. Thorax nearly twice as broad as long; sides straight and parallel behind the middle, thence obliquely rounded and slightly converging towards the apex, the anterior angles obtuse, the hinder ones acute; hinder margin slightly sinuate on either side the middle, thence obliquely truncate to the lateral angle; disk transversely convex, its surface (when seen under a deep lens) obsoletely rugulose. Scutellum trigonate, its apex acute. Elytra broader than the thorax, ovate, convex, faintly excavated below the basilar space, the latter on each elytron obsoletely thickened; surface smooth and shining, impressed with very minute piceous punctures, only visible under a deep lens.

### OCNOSCELIS CYANOPTERA, Erichs.

Weigm. Archiv. 1847, I. p. 174.

MAS.—*Femoribus* anticis incrassatis; *tibiis* anticis quatuor ad apicem incurvatis; *tarsorum* articulo basali dilatato, semiovato.

Var. A. Corpore fulvo, supra cyaneo vix tincto.

Both sexes of the above species are in the collection brought over by H. Thamm. In one specimen of the male the thorax is more coarsely punctured and has on either side, near the lateral margin, an ill-defined, slightly-raised tuberosity; in another, the body is fulvous, slightly tinged above with metallic blue.

*O. purpurata*, Erichs., placed by Baron v. Harold as the ♂ of the present species, differs (judging from Erichson's description) in its bifoveolate thorax and in having the intermediate tibiæ alone incurved; it is probably the ♂ of another species.



*Asphæra Thammi.*

Ovata, postice vix ampliata, convexa, sordide fulva nitida, pectore piceo, abdomine piceo tincto, scutello capite pedibusque (clypeo femoribus que anticis quatuor basi exceptis), nigris; thorace transverso, flavo-fulvo; elytris tenuissime punctatis, nigro-cyaneis, limbo exteriori et utrisque maculis duabus, unâ prope medium transversim ovatâ, secundâ ante apicem, subrotundatâ, flavis.

Long. 4 lin.

Hab.—Peru.

Vertex smooth, impunctate; front impressed on either side near the eye with several large round punctures; encarpæ subquadrate, contiguous; lower portion of clypeus with a strongly-raised transverse ridge; carina elevated, linear, extending downwards to the transverse ridge of the clypeus; antennæ filiform, about four-fifths the length of the body, the lower surface of the basal joint with a fulvous stripe. Thorax more than twice as broad as long; sides parallel at the extreme base, thence rounded and converging to the apex, the apical angles thickened, produced anteriorly, subacute; disk transversely convex, minutely punctured (the punctures only visible under a deep lens), the lateral margin broad, reflexed. Scutellum not longer than broad, trigonate. Elytra broadly ovate, convex, faintly depressed below the basilar space; nigro-cyaneous, very minutely punctured, a large transversely ovate patch on the middle, a second smaller and subrotundate near the apex, together with the outer limb, fulvous. Hinder tibia armed before the apex with a small acute tooth; basal joint of hinder tarsus equal in length to the following two united, claw joint strongly inflated.

*Asphæra discofasciata.*

Elongato-ovata, modice convexa, nigra, nitida, facie inferiori, thorace abdomineque sordide fulvis, antennis piceis; thorace fulvo, nitido, maculâ transversâ discoidali nigrâ; elytris tenuissime punctatis, metallico-purpureis, limbo exteriori fasciâque prope medium fulvis.

Long. 3 lin.

Hab.—Peru.

Encarpæ and clypeus piceo-fulvous, the latter con-

tinguous, separated from the face by a deep transverse groove; carina raised, elongate; labrum black; antennæ filiform, four-fifths the length of the body, the basal joint beneath fulvous, the 3rd joint twice the length of the 2nd. Thorax twice as broad as long; sides straight and parallel at the base, thence slightly rounded and obliquely converging towards the apex, the apical angles thickened, produced anteriorly into a conic obtuse tooth; upper surface nitidous, the sides broadly margined, middle disk with an irregular transverse purple patch. Scutellum trigonate. Elytra broader than the thorax, oblong-ovate, moderately convex, slightly excavated below the basilar space, nitidous, very minutely punctured, the punctures only visible under a strong lens; metallic purple, the outer limb and a broad transverse band across the middle fulvous. Hinder tibia slightly emarginate before its apex; hinder claw swollen.

*Asphæra limbifera.*

Elongato-ovata, convexa, subtus pallide picea, nitida, femoribus apice, tibiis tarsisque nigro-piceis; thorace abdomineque sordide fulvis; supra fulva, antennis piceis, scutello elytrisq̄ metallico-purpureis, his limbo exteriori fulvo.

Long.  $3\frac{1}{4}$  lin.

*Hab.*—Peru.

Vertex smooth, impunctate; encarpæ subtrigonate, contiguous; carina narrow, wedge-shaped; clypeus thickened; antennæ filiform. Thorax twice as broad as long; sides obliquely truncate at the extreme base, thence rounded and converging to the apex; apical angles thickened, produced anteriorly into a subconic obtuse tooth; disk shining, impunctate, lateral border broadly margined. Scutellum not longer than broad, trigonate. Elytra narrowly oblong, not dilated posteriorly, convex, flattened along the suture, slightly depressed below the basilar space, very minutely punctured. Hinder tibia slightly emarginate before the apex; hinder metatarsus equal in length to the following two joints united; hinder claw only slightly thickened.

*Ædionychis signifera.*

Anguste ovata, modice convexa, nigra, nitida, capite piceo, clypeo flavo, antennis extrorsum nigris; thorace

elytrisque sordide flavis, his tenuissime punctatis, maculâ irregulari scutellari, vittâ brevi humerali, maculâque inter medium et apicem, prope marginem positâ, nigris.

Long. 3 lin.

*Hab.*—Chanchamayo.

Head scarcely broader than long; encarpæ contiguous; lower portion of clypeus traversed by a strongly-raised transverse ridge; carina strongly elevated, linear, terminating anteriorly on the transverse ridge; antennæ filiform, the five lower joints piceous, the rest black. Thorax nearly twice as broad as long; sides rounded and slightly converging from the base to the apex, the hinder angles acute, the anterior ones armed with an obtuse excurved tooth; disk shining, very minutely punctured, very faintly wrinkled, impressed just in front of the basal margin with an ill-defined transverse groove; lateral margin broadly reflexed, finely rugulose. Elytra broader than the thorax, oblong-ovate, convex, minutely punctured, piceo-flavous; an irregular patch surrounding the scutellum, a short vitta on the humeral callus and an oblong spot on the outer disk halfway between the middle and the apex, black.

### *Ædionychis pulchra.*

Anguste ovata, postice paullo ampliata, convexa, nigra, nitida, abdomine thoraceque fulvis, hoc lævi, lateribus late reflexo-marginatis, a basi ad apicem rotundato-angustatis; elytris crebre punctatis, metallico-viridibus, subviolaceis, limbo exteriori apiceque late fulvis.

Var. A. Elytrorum dimidio postico fulvo.

Long. 3—4 lin.

*Hab.*—Peru; also Ecuador: var. A. Ecuador.

Vertex sparingly punctured; front separated from the encarpæ by a deep transverse depression; encarpæ large, thickened, contiguous; carina subhastate; clypeus obliquely elevated on either side, nigro-piceous, a large patch on each side flavous; antennæ filiform, black, the three lower joints stained beneath with pale piceous; the 3rd and following two joints nearly equal in length, each twice as long as the 2nd; apices of jaws piceo-rufous. Thorax nearly three times as broad as long; sides broadly margined, rotundate-angustate from base to apex, the anterior angles mucronate; basal margin deeply excavated; disk trans-

versely convex, the lateral margin broadly reflexed; surface smooth, impressed (when seen under a deep lens) with very minute punctures. Scutellum as broad as long, trigonate. Elytra oblong-ovate, very slightly dilated posteriorly, convex, slightly excavated below the basilar space; granulose, closely impressed with fine but distinct punctures; apical margin of elytra entire. Basal joint of hinder tarsus rather shorter than the following two united.

The more elongate form, more distinctly-punctured elytra, together with the entire apical margin of the latter, will separate this insect from *sagulata* and *præcineta*, Erichson.

*Monoplatus fulvus.*

Anguste ovatus, convexus, fulvus, nitidus, antennis (basi exceptis), piceis, oculis nigris; thorace distincte subremote punctato, basi transversim sulcato; elytris regulariter punctato-striatis.

Long. 2 lin.

*Hab.*—Chanchamayo.

Head trigonate; vertex and front thickened, the latter produced anteriorly into a wedge-shaped elevated space, which extends downwards between the antennæ; encarpæ obsolete; carina raised, linear; eyes prominent, shining black; antennæ filiform, four-fifths the length of the body, the 3rd, 4th and 5th joints each equal in length to the 1st, each more than twice the length of the 2nd, the three lower ones fulvous, the rest piceous. Thorax nearly twice as broad as long; sides straight and parallel at the base, slightly dilated and rounded before the middle, the anterior angles obliquely truncate, produced laterally into a very short acute tooth, the hinder angles acute; disk distinctly but not closely punctured, impressed at the base with a deep transverse groove, which terminates abruptly on either side, at some distance within the lateral margin. Elytra oblong-ovate, convex, slightly flattened along the suture, very faintly depressed below the basilar space; each elytron with eleven regular rows of distinct punctures, the first and last three interspaces plane, remotely impressed with a few very minute punctures.

This insect is about the same size and coloration, and has a remarkable resemblance to several of the common European species of *Crepidodera*.

*Omotyphus Erichsoni.*

Ovata, valde convexa, picea, nitida, subtus sparse sericea, supra setosa, pedibus anticis quatuor, tibiis posticis antennisque sordide fulvis, his ad apicem subincrassatis, articulis 7<sup>mo</sup> 8<sup>vo</sup> 9<sup>no</sup> nigro-piceis, femoribus posticis apice tarsisque pallide piceis; thorace transverso, rugoso-punctato, disco pone medium transversim depresso, ante medium quadrituberculato; clytris convexis, infra basin profunde arcuatim, pone medium minus profunde transversim excavatis, profunde punctato-striatis, interspatiis convexis.

Long. 2 lin.

*Hab.*—Chanchamayo.

Head much longer than broad, subeuneiform; vertex rugose-punctate; encarpæ thickened, pyriform, separated by a deep groove; clypeus transversely depressed across its middle, its hinder half obliquely elevated; antennæ about half the length of the body, their five outer joints distinctly thickened; the 2nd one short, ovate, the 3rd more than twice its length, distinctly longer than either the 4th or 5th, these latter equal. Thorax one-half broader than long; sides parallel, bisinuate, the anterior and posterior angles thickened, prominent; disk rugose-punctate, clothed with adpressed piceous hairs, the hinder disk transversely depressed, the anterior disk with four distinct tuberosities placed transversely on its surface, the two lateral smaller than the intermediate ones. Elytra much broader than the thorax, quadrate-ovate, convex, obliquely excavated below the basilar space, transversely excavated (but much less distinctly) below the middle, strongly punctate-striate, the interspaces thickened, subcostate; surface clothed with long, suberect piceous hairs.

*Octogonotes limbatus.*

Anguste oblongus, niger, subtus sparse, supra dense sericeo pubescens; capite thoraceque aureo-sericeis, hoc quam longo fere duplo latiori, lateribus parallelis, ante medium leviter angulatis, picco-nigro, disco deplanato, arcuatim excavato; clytris sat fortiter punctato-striatis, interspatiis rugulosis; nigro-sericeis, limbo laterali late fulvo, hoc limbo nec non lineâ suturali aureo-sericeis.

Long. 3 lin.

*Hab.*—Chanchamayo.

Head longer than broad, wedge-shaped, clothed with adpressed sericeous hairs; antennæ filiform, slightly thickened towards the apex, the two outer joints fusco-fulvous; encarpæ thickened, separated (their extreme apices excepted), by a wedge-shaped fovea; labrum piceous. Thorax nearly twice as broad as long; sides parallel; disk densely clothed with adpressed aureous hairs, closely covered with round shallow punctures, surface obliquely excavated on either side, transversely excavated on the middle of the hinder disk, these excavations conjointly forming an arcuate depression, which extends entirely across the thorax. Scutellum trigonate. Elytra much broader than the thorax, oblong, parallel on the sides, their apex regularly rounded; disk convex, depressed along the suture, rather strongly and regularly punctate-striate, the interspaces finely rugulose-reticulate.

*Cerichrestus Thammi.*

Elongatus, modice convexus, sericeo pubescens, pedibus flavis, tibiis apice tarsisque infuscatis; capite rude rugoso; thorace fulvo, aureo-sericeo, lateribus rectis, disco pone medium transversim depresso; elytris thorace latioribus, subelongatis, modice convexis, pube suberectâ griseâ vestitis, fortiter punctato-striatis, interspatiis nitidis, ad latera et ad apicem convexiusculis.

Long.  $1\frac{1}{2}$  lin.

*Hab.*—Chanchamayo.

Head scarcely longer than broad, trigonate, nearly glabrous, the lower face alone being sparingly clothed with griseous hairs; vertex and front coarsely rugose-punctate; encarpæ and carina obsolete; clypeus transversely trigonate, obliquely elevated, its surface shining impunctate; antennæ filiform, nearly two-thirds the length of the body. Thorax nearly one-half broader than long; sides straight, slightly diverging from the base to the apex, obsolete thickened just behind the anterior angle; disk transversely depressed behind the middle, clothed with aureo-sericeous hairs. Elytra elongate-ovate, subparallel on the sides, moderately convex, slightly flattened along the suture, clothed with suberect griseous hairs, strongly punctate-striate; interspaces on the outer disk and apex slightly convex.

*Diabrotica limbifera.*

Subelongata, nitida, subtus flava, femoribus dorso, tibiis anticis extus, posticis quatuor totis tarsisque nigris; supra nigra, capite (antennis exceptis) flavo-testaceis; thorace profunde bifoveolato, lateribus anguste flavo-albis; elytris irregulariter punctatis, rugulosis, limbo exteriori anguste flavo-albido.

Long. 2 lin.

*Hab.*—Chanchamayo.

Head longer than broad, wedge-shaped; encarpæ transverse-quadrate, contiguous; eyes large, prominent, black; antennæ slender, filiform, the 2nd joint about half the length of the 1st, one-third shorter than the 4th; basal joint (its apex excepted) fulvous, the rest entirely black. Thorax one-fourth broader than long; sides straight and parallel from the base to beyond the middle, thence very slightly converging towards the apex; disk distinctly but not closely punctured, impressed on either side with a large deep fovea, the space between them depressed. Elytra broader than the thorax, oblong, very slightly dilated posteriorly, convex, flattened along the suture, very faintly depressed below the basilar space, irregularly punctured, interspaces rugulose.

*Diabrotica setifera.*

Obovata, convexa, nitida, nigro-ænea, pedibus piceo-æneis, coxis femoribusque anticis quatuor flavis; antennis (basi piceâ exceptâ) nigris; thorace transverso-quadrate, lateribus parallelis, ante medium obsolete angulatis, disco minute punctato; elytris viridi-æneis, thorace multo latioribus, postice ampliatis, convexis, minute remote punctatis, setis erectis sparsissime vestitis.

Long.  $1\frac{2}{3}$  lin.

*Hab.*—Chanchamayo.

Head trigonate; vertex metallic green, impunctate; encarpæ thickened, transverse, contiguous; clypeus triangular, coarsely punctured, clothed with long silky hairs; carina ill defined; antennæ equal to the body in length, slender, filiform, the 2nd joint four-fifths the length of the 3rd, the latter rather shorter than the 4th. Thorax one-fourth broader than long; sides straight and parallel, obtusely angled before the middle, thence slightly con-

verging to the apex; the anterior angles thickened, obtuse, the hinder ones acute; disk very finely granulose, finely and remotely punctured. Scutellum trigonate, its apex acute. Elytra much broader than the thorax, subquadrate-ovate, dilated posteriorly, broadly rounded at the apex, convex, remotely punctured, very sparingly clothed with erect griseous hairs, visible only at the apex and on the lateral margin.

The erect hairs on the elytra will distinguish this insect from any known species of the genus.

*Monocesta sublimbata.*

Anguste oblonga, subtus nitida, picea, fusco pubescens, femoribus fusco-fulvis; supra nigra, opaca, grisco-sericea, facie inter oculos thoraceque fusco-fulvis, hoc rugoso, transversim excavato, fasciâ discoidali nigrâ; elytris rugosis, obscure viridibus, limbo submarginali limboque inflexo obscure rufo-fulvis.

Long. 3 lin.

*Hab.*—Chanchamayo.

Head wedge-shaped; vertex rugose; encarpæ thickened, subquadrate, contiguous; jaws shining black; antennæ about half the length of the body, the basal joint fulvous. Thorax three times as broad as long; sides rounded, converging towards the apex, hinder angles obtusely rounded; disk broadly and deeply excavated, transversely rugose, a transverse patch on the disk, its hinder margin emarginate in the middle, black. Elytra narrowly oblong, convex, densely clothed with short adpressed sericeous pubescence, closely rugose.

*Monocesta approximata.*

Elongato-ovata, convexa, pallide rufo-picea, fulvo-sericea, subtus nitida, supra opaca, oculis antennisque nigris; thorace ante medium profunde transversim excavato; elytris rugosis, lateribus parallelis, dense fulvo-sericeis.

Long.  $3\frac{2}{3}$  lin.

*Hab.*—Chanchamayo.

Head trigonate, not longer than broad, vertex and front rugose, the former with a transverse black patch; encarpæ ill defined, lower portion of clypeus elevated into



a strong transverse ridge; antennæ more than three-fourths the length of the body, the 3rd joint shorter than the 4th, the latter distinctly longer than the 5th; the basal joint fulvous, the rest black. Thorax nearly three times as broad as long at the base; sides rounded and converging from the base to the apex, sinuate just behind the anterior angle, the latter obtuse, hinder angles acute; upper surface rugose, clothed with adpressed fulvous hairs, the anterior disk deeply and broadly transversely excavated. Elytra broader than the thorax, parallel on the sides, convex, rugose-punctate, densely clothed with short adpressed sericeous hairs.

From *M. nigricornis*, Clark (to which insect the present species is most nearly allied), it may be known by the more parallel form, by the more deeply excavated thorax, and by the different relative length of the joints of the antennæ.



XVIII. *Descriptions of two new Lepidoptera of the family Sphingidæ.* By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Read October 1st, 1879.]

THE following new species have recently been added to the collection of the British Museum:—

*Angonyx borneensis*, n. sp.

Allied to *A. assamensis*, slightly larger, the primaries above silvery-grey, clouded on inner margin and disc with snow-white, a white line running obliquely from the centre of the disc to near the apex, where it joins a black line running to the apex; two large black spots separated only by the upper discocellular veinlet at the end of the cell; a dentate-sinuate slender brown line across the disc and partially defining the limits of the discal white nebula, a corresponding parallel but abbreviated line at external angle, the lowest sinuation being black; secondaries purplish-brown with darker outer border sparsely sprinkled with grey scales; abdominal area testaceous, limited internally by a black longitudinal streak; body silvery grey, the sides of head, thorax and the tegulæ dark olivaceous, edged externally with snow-white; under surface ruddy-greyish with cold grey outer borders to the wings; primaries with the outer border dark, deeply dentated internally, its lower half bounded by cream-coloured sagittate spots; basal three-fifths of inner border cream-coloured; upper half of outer border bounded internally by an oblique dull red streak; an oblique blackish spot across the costal border near apex, a blackish streak on discocellulars; secondaries with pale abdominal area; a subanal marginal brown spot, bounded internally by a cream-coloured spot; base of palpi and front of anterior coxæ white, hinder edges of posterior segments of venter rose-red, spotted with projecting white scales at the sides; anus white: expanse of wings 2 inches 2 lines.

*Hab.*—Borneo.

This species appears to be not uncommon in Borneo, although until this year I never saw it. It is very similar in pattern to *A. assamensis*, but differs entirely in colour.

*Angonyx vigens*, n. sp.

Same size and form as the preceding; primaries above pale greyish-brown, tinted with rose-colour and clouded with green; a bright green patch from base to second third of internal area, a whitish nebula about the centre of the disc with similar (but less vivid) oblique line running to apex, to that of the preceding species; a subpyriform inverted black spot at the end of the cell, followed immediately by a straight transverse black belt, which crosses the wing from costa to inner margin; two pale-edged recurved dusky lines across the basal area, a pale-edged black spot at base of costa, a crenulated blackish discal line, most distinct at costa and inner margin, a black spot close to external angle; secondaries nearly as in the preceding species, but more purple in tint, the outer border limited internally by indistinct red spots; body purplish-brown, clouded with green; the sides of head, thorax and the tegulae dark olivaceous, edged externally with lilacine, green and white: under surface much like the preceding species, altogether redder, the apical fourth of costal border of primaries whitish; external border less prominent, less strongly dentated, only bounded internally by a pale ochraceous angulated spot near the inner margin; disc distinctly red and limited internally by a black line elbowed upon the costa; the subapical costal oblique spot greyish, outlined and intersected by black lines, a whitish wavy streak across the outer border; secondaries rosy-grey, with the outer border whitish internally, indications of three parallel blackish lines, between which the veins are white, across the disc; body rosy-grey, with markings as in *A. borneensis*: expanse of wings 2 inches.

*Hab.*—Philippines.

This beautiful species probably replaces *A. borneensis* in the Philippines.

XIX. *Descriptions of two new genera and species of Coleoptera from Madagascar belonging to the families Tenebrionidæ and Cerambycidæ.* By CHAS. O. WATERHOUSE.

[Read October 1st, 1879.]

THE two insects described in this paper have recently been added to the British Museum from Madagascar. The first is a Heteromeres insect, which is very remarkable, as being closely allied to two strictly American genera. The second is one of the Longicornia, for which I have been obliged to propose a new genus.

TENEBRIONIDÆ.

PYCNOCHILUS, nov. gen.

Form and appearance of *Delognatha*. Submentum nearly as in *Phrenapates*, with its lateral lobes porrect and partially covering the base of the mandibles. Mentum trapezoidal, concave; the anterior angles obtusely rounded and elevated, the anterior margin obtusely emarginate in the middle. Ligula at least as long as broad, narrower than the mentum, subparallel at the sides, regularly rounded in front; palpi short, the 2nd joint subglobose, the apical joint very slightly curved, cylindrical, a little narrowed at the apex, as long as the two preceding together. Outer lobe of the maxillæ somewhat parallel (only a little narrower at the base), less flat than in *Delognatha*, curved inwards at the apex, which is obtuse, and set with eight or ten stiff, curved bristles; the inner lobe is not much shorter than the outer one, narrow, ciliated; the first three joints of the palpi are subequal, about one-third longer than broad; the apical joint is as long as the two preceding taken together, cylindrical. Labrum transverse, deflexed in front, the anterior border arcuate. Mandibles with three teeth at the apex. Eyes as in *Phrenapates*, but not laterally prominent. Basal

joint of the antennæ moderately elongate, club-shaped, the 2nd to 5th joints moniliform, the 6th to 10th transverse, gradually becoming wider, the 11th joint subrotundate, flattened. When in repose the antennæ are received into a channel beneath the eye. Other characters as in *Delognatha*.

This genus should be placed between *Phrenapates* and *Delognatha*; it is particularly interesting on account of the species of both the allied genera being South American.

*Pycnochilus advenus*, sp. n.

Elongatus, subcylindricus, piceus vel nigro-piceus, nitidus; capite thoraceque subtiliter sat crebre punctulatis; elytris fortiter striatis, striis fortiter punctatis, interstitiis bene convexis, lævibus.

Long.  $4\frac{1}{2}$ —6 lin.

♂. Head very wide, with a deep impression above the eyes, with two slight approximate tubercles on the forehead, and with a more prominent tubercle above the base of each mandible, the transverse space between the last tubercles is on a lower level than the frontal tubercles; the punctuation is very fine and moderately thick, the sides of the head are rounded. Thorax in front a little wider than the head, very little narrowed posteriorly, one-quarter broader than long, more sparingly punctured than the head, the anterior angles a little prominent, acute. Scutellum very small, rounded behind. Elytra very deeply striated, the striæ strongly and closely punctured.

♀. The mandibles less porrect, with an obtuse tooth above near the base. Head less broad, and with the tubercles nearly obsolete.

*Hab.*—Antananarivo (Mr. Kingdon).

CERAMBYCIDÆ.

OPSAMATES, nov. gen.

Head channelled between the antennal tubercles, with no mesial carina, cheeks extremely short. Antennæ of the female reaching to the middle of the elytra; the basal joint obconic, the 3rd a very little longer than the first, twice as broad at the apex as at the base, the apical angle slightly prominent; the 4th to 8th joints of about the

same length as the 3rd, but narrower at the base, and with the apical angle very gradually more produced; the 10th joint a little narrower, the 11th narrow, lanceolate, constricted before the apex. Eyes widely separated above and below, semicircularly emarginate in front, coarsely granular. Thorax tubercular above, with a single short spine at the side. Scutellum slightly concave, scarcely narrowed towards the apex, which is rounded. Elytra subparallel, the surface uneven, obtuse and unarmed at the apex. Legs short, femora compressed, spines at the apex of the tibiæ very short and seen with difficulty; tarsi as in *Plocæderus*, but much shorter, the claw joint very slender at the base, but rather broad at the apex. Mesosternal process not very broad, slightly narrowed posteriorly and emarginate at the apex. Prosternal process very narrow, arched posteriorly.

The position of this genus is somewhat doubtful. It appears to belong to the true *Cerambycidae* of Lacordaire. The obtuse tubercles on the thorax, the form of the scutellum, the wrinkled elytra (which have no spine at the apex), and the arched prosternum are, however, somewhat foreign to this family. On the other hand, the general form and the structure of the antennæ most nearly approach *Prosphilus*. The ligula is membranous and is completely bilobed, crescent-shaped. On the whole, it seems best to place the genus before *Taurotagus*.

*Opsamates dimidiatus*, sp. n.

Niger, nitidus, parce pubescens; antennis flavo-ferrugineis, articulis duobus basalibus nigris, thorace dorsim tuberculis obtusis quinque instructo, elytris dimidio basali flavo, inæqualibus, discrete punctatis. ♀.

Long. 13 lin.

Head very short, the eyes a little prominent laterally, not surrounding the insertion of the antennæ so much as in *Plocæderus*. Thorax slightly transverse, a little broader than the head, with sparse (but rather long) black pubescence, with a not very prominent tubercle in the middle of the side, and a slight angular prominence immediately in front of it, with seven tubercles above; there is also a very small tubercle behind the lateral tubercle. Elytra one-third broader than the thorax, parallel, together rounded at the apex, with rather more

than the basal half yellow, the surface wrinkled or with numerous confluent impressions, and with rather strong punctures scattered in the impressions, each puncture has a very short black hair. Legs short and compressed, the posterior femora scarcely reaching beyond the middle of the second abdominal segment; tibiæ with an obscure pitchy spot on the outer edge near the apex.

*Hab.*—Fianarantsoa (Mr. Shaw).



XX. *List of the Hemiptera collected in the Amazons by Prof. J. W. H. TRAIL, M.A., M.D., in the years 1873—1875, with descriptions of the new species.* By F. BUCHANAN WHITE, M.D., F.L.S.

[Read November 5th, 1879.]

## PART I.

### Fam. HYDROMETRIDÆ.

#### HYDROMETRA, Latr.

(*Limnobates*, Burm.)

1. *H. metator*, B. W., Journ. Linn. Soc. (Zool.) xiv. 486, 9.

*Hab.*—Uruçaca, Rio Juruá (November 1, 1874). One specimen.

2. *H. mensor*, n. sp.

Testaceo-brunnea, oculis rufo-brunneis, tibiis ad apicem tarsisque fusco-brunneis. Capite parte anteooculari parte posteooculari fere  $1\frac{1}{2}$  longiore; pronoto ante marginem posticum tuberculis 2 subelongatis instructo; hemelytris dimidio abdominis tegentibus.

♂. Long.  $11\frac{1}{2}$ — $12\frac{1}{2}$  mm.

*Hab.*—Manaos (August, 1875). Two specimens, "at light," on board the steamer. The much smaller size will at once distinguish this from *H. metator*.

### Fam. VELIIDÆ.

#### VELIA, Latr.

3. *V. virgata*, B. W., Journ. Linn. Soc. (Zool.) xiv. 486, 11.

*Hab.*—Igarapé da Caxoeira, near Manaos (June 4, 1874), and Manaos (August, 1875). Two specimens, "at light," on board the steamer.

## NEOVELIA, B. W.

4. *N. Trailii*, B. W., Journ. Linn. Soc. (Zool.) xiv. 487, 12.

*Hab.*—Manaos (August, 1875). Two specimens, “at light.”

## MICROVELIA, Westw.

5. *M. mimula*, B. W., Journ. Linn. Soc. (Zool.) xiv. 487, 13.

*Hab.*—Manaos (August, 1875). One specimen, “at light.”

## Fam. HEBRIDÆ.

## MESOVELIA, M. &amp; R.

6. *M. Mulsanti*, n. sp.

Sordide flavo-testacea, subopaca, plus minus fusco-nebulosa; clypeo, ocellis, pronoto marginibus angustissimis foveisque lobi antici et lobo postico, scutello marginibus et maculis literam C simulantibus in utroque latere disci plagæ anticæ sitis, hemelytris venis, tarsis articulo ultimo, necnon spinulis pedum plus minus nigro-brunneis; antennis articulis 1° 2°que ad apicem, 3° 4°que totis, tibiis ad apicem, tarsorum articulo 1° et articulo 2° ad apicem fusco-brunneis; hemelytris albidis, corio cellulæ interioris dimidio apicali, clavo margine apicali et margine interiore pone medium necnon macula discali fuscis; capite antice albo-piloso, macula utrinque prope basin antennarum fusca, et macula minore utrinque pone illas nigro-brunnea; pronoto lobo postico linea longitudinali flavo-testacea notato, angulis posticis emarginatis; scutelli plaga antica fovea semicirculari utrinque instructa; hemelytrorum membrana vena fusco-brunnea subsinnata, ex apice cellulæ interioris corii ad angulam apicalem interiorem membranæ currente et membranam a clavo separante, instructa, (membrana interdum obsoleta); corpore subtus albedo-testacco, albo-piloso.

Long. 4 mm.

*Hab.*—Rio Purus (September 24, 1874). Two specimens.

Rather closely allied to the only other known species of the genus, the European *furcata*, M. & R. In one specimen the clavus is much prolonged posteriorly, being larger than the corium, and is separated from the long and broad membrane by a curved vein; in the other

example the clavus is reduced to one-fourth the size, and there is no trace of the membrane nor of the vein that bounds the clavus.

I have dedicated this species to the distinguished founder of the genus, M. Mulsant, of Lyons.

Fam. GERRIDÆ.

HYDROBATES, Er.

7. *H. regulus*, B. W., Journ. Linn. Soc. (Zool.) xiv. 488, 14.

*Hab.*—Labria, Rio Purus (September 16, 1874). Several specimens.

LIMNOGONUS, Stål.

8. *L. hyalinus*, F., *Hydrometra hyalina*, F., Syst. Rhyn. 258, 4; *Limnogonus hyalinus*, Stål. Hem. Fabr. i. 133, 1.

*Hab.*—Manaos (1874). Four specimens.

9. *L.?* *lotus*, B. W., Journ. Linn. Soc. (Zool.) xiv. 488, 15.

*Hab.*—Manaos (1874). Six specimens.

This and the following do not altogether agree with Stål's definition of the genus, but may be placed in it, at least in the meantime.

10. *L.?* *lubriens*, B. W., Journ. Linn. Soc. (Zool.) xiv. 489, 16.

*Hab.*—Rio Purus (September 24, 1874) and Manaos (August, 1875). Three specimens.

Fam. NAUCORIDÆ.

PELOCORIS, Stål.

11. *P. impicticollis*, Stål, Enum. Hem. 5, 144, 2.

*Hab.*—Montealegre (November, 1873) and Camaná, Rio Javary (December 6, 1874). Two specimens.

12. *P. procurrens*, B. W., Journ. Linn. Soc. (Zool.) xiv. 489, 17.

*Hab.*—Montealegre (November, 1873). One specimen.

## Fam. BELOSTOMATIDÆ.

## ZAITHA, A. &amp; S.

13. *Z. zelotypus*, n. sp.

Oblongo-subovata, sordide testacea; pronoto præcipue disco fusco-brunneo-nebuloso; hemelytris fusco-brunneis, margine antico dilute pallido-testaceo fusco-brunneo-maculato; scutello fusco-brunneo leviter violaceo-micante; capite pedibusque fusco-brunneo-maculatis; pronoti disco linea angustissima longitudinali flavo-testacea ornato. Pronoto latitudine antica  $\frac{1}{4}$  brevior, lateribus distincte sed leviter et late sinuatis, margine postico late sinuato; membrana 9-nervosa; tibiis vix dilatatis.

Long. 11 mm., lat.  $5\frac{1}{2}$  mm.

*Hab.*—Montealegre (November, 1873). One specimen.

Closely allied to *Z. micantula*, Stål, and perhaps only a variety thereof, but seems to differ in the colour, form of pronotum, number of the membrane-nerves, and in the smaller stature.

## Fam. NEPIDÆ.

## RANATRA, Fab.

14. *R. annulipes*, Stål, Öfv. Vet. Ak. Förh. 1854, 241, 1, and 1861, 204, 5.

*Hab.*—Pará (February 25, 1875). One specimen.

Though the back of the abdomen is blackish, and not sanguineous fuscous as described, I think I am right in the determination of this specimen.

15. *R. rabida*, n. sp.

Brunneo-grisea, abdomine dorso eoneolore; pedibus obsolete brunneo-annulatis; stigmatibus concoloribus dorso pellucentibus; fronte convexiusculo; prosterno anterieus bisulcato; femoribus anticis pone medium intus unidentatis, extus ibidem et prope apicem inermibus, margine inferiore prope apicem subsinuato; femoribus intermediis posticisque subæquilongis, his ad medium segmenti penultimi abdominis porrigendis; metasterno convexo posterius dilatato et leviter carinato, margine postico triangulari apice truncato, basin coxarum posticarum vix superante;

segmento primo ventrali inter coxas longe prominulo; aidothecæ appendicibus corpore æquilongis.

Long. 27 mm., lat.  $2\frac{1}{2}$  mm.

*Hab.*—Lages, mouth of Rio Negro (August 3, 1874).  
One specimen.

Distinct from the other described American species in the form of the metasternum, more slender stature, &c.

## Fam. NOTONECTIDÆ.

### ANISOPS, Spin.

#### 16. *A. amnigenus*, n. sp.

Sordide testaceo-albidus, lævis, nitidus, pilis longis pallidis sparse vestitus; pedibus flavescenti-albidis plus minus brunneo-infuscatis; abdomine fusco-atro; oculis griseo-brunneis magnis posteriorius ad marginem posticum capitis conjunctis ( $\delta$ ) vel fere conjunctis ( $\text{♀}$ ); vertice leviter convexo-prominulo in medio anguste longitudinaliter sulcato; fronte leviter convexo prominulo; pronoto ( $\delta$ ) anteriorius obsoletissime carinato; tarsis anticis in utroque sexu dimeris; tibiis tarsisque posticis pilis pallidis et fuscis instructis.

Long. 5— $5\frac{1}{2}$  mm.

*Hab.*—Manaos, August, 1875.

Two specimens, not in the best condition for describing. Hence I have not been able to describe minutely the coloration of the underside or of the legs.

### MARTAREGA, gen. nov.

Corpus oblongum, cylindricum. Caput magnum, supra subquadratum, margine antico pronoto latius; vertice anguste triangulari, convexo-prominulo; fronte lineari convexiusculo. Oculi maximi supra visi suboblongi, per dimidium posteriorius longitudinis conjuncti, margine postico rotundato-producto et pronoto incumbente; ad latera visi semilunares, margine postico bisinuato; infra visi triangulares. Antennæ articulo 1° brevissimo latiore quam longior; 2° crasso, longo, cylindrico; 3° cylindrico, 2° longiore sed multo graciliore, seriebus duabus pilis longis instructo, pilis seriei posterioris capitulatis; 4° dimidio 3<sup>i</sup> æquilongo, graciliore, cylindrico. Rostrum quadriarticulatum, articulis 1° 2°que brevibus, transversis, 3° 1° 2°que simul sumptis æqui-

longo, 4° brevi, conico. Labrum triangulare acutum, medium articuli 2<sup>i</sup> rostri attingens. Pronotum breve, transversum, longitudine media fere triplo latius; margine antico bisinuato; margine postico late et leviter sinuato; marginibus lateralibus acutis oblique sinuatis; lateribus prothoracis excavato-concavis. Scutellum mediocriter triangulare apice acuminato. Metanotum scutello fere duplo longius. Hemelytra membranacea, nec membrana nec sutura clavi distinctis. Alæ desunt. Pedes spinulis nonnullis instructi; tarsis anticis monomeris (♂) vel dimeris (♀); tarsis intermediis monomeris; tarsis posticis dimeris; femoribus, tibiis et tarsis posticis inter se subæquilongis.

Resembling *Anisops* in general appearance, but very different in structure.

17. *M. membranacea*, n. sp.

Sordide testaceo-albida, hyalina, nitida; oculis pallide rufo-brunneis; hemelytris hyalinis vittis 2 longitudinalibus percurrentibus opacis albidis, una exteriori externe angustissime nigro-marginata ad aream marginalem sita, altera interiore pone medium furcata; labro, articulo 3° rostri (marginibus exceptis), femoribus ad basin, tarsis ad apicem piceo-brunneis; rostro articulo 4° piceo-nigro; corpore subtus et tibiis tarsisque posticis longe nigropilosis.

Long. 4—4½ mm.

*Hab.*—Manaos (1874) and Rio Purus (September 24, 1874). Several specimens.

Fam. CORIXIDÆ.

CORIXA, Geoff.

HETEROCORIXA, *subgen. nov.*

Caput pronoto anterius paullo latius; margine postico bisinuato; vertice longitudinaliter obtuse carinato. Oculi magni triangulares marginem posticum capitis haud attingentes; angulo inferiore longe producta subacuta; angulo exteriori marginem posticum capitis fere attingente. Pronotum breve vertice subæquilongum. Membrana hemelytri sinistri membranacea, linea suturæ distinctissima; membrana hemelytri dextri coriacea, corio concolor, linea suturæ haud discreta.

Unfortunately, all the specimens I have seen are ♀s, and therefore I know nothing of the structure of the ♂ abdomen, and cannot say whether it is asymmetrical or whether a strigil exists. Though the facies of the insect is quite that of *Corixa*, the form of the eyes and the structure of the left hemelytron brings it into relation with *Sigara*, and the short pronotum somewhat resembles that of *Cymatia*. When the structure of the ♂ is ascertained, it may be necessary to give *Heterocorixa* generic rank.

18. *C. (II.) hesperia*, n. sp.

Nigro-fusca, subnitida, punctis et signaturis vermiculatis pallido-testaceis dense notata; pronoto lineis transversis 5 angustissimis fusco-nigris; clavo ad angulum interiorem subtetaceo lineolis irregularibus obliquis fusco-nigris notato; embolio et area marginali corii opacis innotatis; membrana dextra corio concolori, margine apicali subinnotato; membrana sinistra pallide fusca innotata, margine antico fusco-brunneo, linea suturæ anguste fusco-brunnea; abdomine dorso sordide testaceo fusco-nebuloso; pectore pallido-testaceo; ventre sordide testaceo, segmentis 4°, 5°, 6°que ad angulos posticos fusco-maculatis. Tarsis anticis tibiis anticis haud duplo longioribus, cultratis, acutis; tarsis intermediis unguiculis sublongioribus; tarsis posticis fusco-pilosis.

♀ Long.  $5\frac{1}{2}$  mm., lat. 2 mm.

*Hab.*—Prainha (November, 1873). Five specimens.

SIGARA, Fab.

19. *S. fuscata*, Stål, Eugen. Hem. 268, 138.

*Hab.*—Prainha (December, 1873) and Ilha das Araras, Rio Madeira (June, 1875). Two specimens which probably belong here, though not exactly agreeing with Stål's rather short description.

20. *S. selecta*, n. sp.

Brunneo-fusca, capite et scutelli disco dilutioribus, subtus pedibusque testaceo-albidis; hemelytris maculis pallidis indistincte irroratis, area marginali pallide fusca maculis 4 fusco-brunneis notata; hemelytris interdum sparsissime fusco-brunneo-punctatis.

Long. 5 mm.

*Hab.*—Manaos (August, 1875), "at light." Many specimens.

These and the following species of *Sigara* form a group distinguished by several characteristics. The scutellum is larger, being as long or longer than the head seen from above; the pronotum is very short, much shorter than the head or the scutellum, and somewhat crescentic in shape; and at the base of the clavus is a pale V-shaped mark, of which one limb rests on the basal margin, and the apex fills the inner basal angle. Many of Dr. Trail's specimens, having been preserved in alcohol, are not in the best condition for determination, as when dried the pronotum and hemelytra get more or less distorted. The most evident distinction between the species are the markings of the hemelytra, the comparative stature, and the shape of the head. The species just described (*S. selecta*) can be readily separated from the others by its larger size and indistinctly-mottled hemelytra.

21. *S. signata*, n. sp.

Dilute fusco-grisea, subtus pedibusque griseo-albidis; clavo sutura, margine interiore et vitta discali, corio lineolis longitudinalibus nonnullis plus minus fractis irregularibusque aurantio-rubris.

Long. 3 mm.

*Hab.*—Rio Purus (November, 1873). Nine specimens.

Readily distinguished by the orange-red markings, which vary in intensity, and are in the form of dots and blotches, and not in regular bands.

22. *S. socialis*, n. sp.

Brunneo-fusca, capite, subtus pedibusque fusco-albidis; clavo marginibus irregulariter, corio lineolis longitudinalibus plus minus indistinctis, area marginali maculis 3 fuscis; membrana elytri sinistrorsi leviter infuscata ad apicem corii macula fusca notata; femoribus posticis subtus vitta et serie punctorum fuscis sæpissime notatis; vertice subquadrato, margine postico longitudine media subæquilongo.

Long.  $2\frac{1}{4}$ — $2\frac{3}{4}$  mm.

*Hab.*—Rio Madeira up to São Antonio da Boa Vista (June, 1874); Anana, Upper Amazon (September, 1874); Urubu Caxoeira, Rio Juruá (November, 1874); Rio Trombatas (March, 1875); and Manaos (August, 1875). Very many specimens, "at light," &c.

Varies very much in the degree of coloration and markings. In some cases the hemelytra have only pale



fuscous longitudinal lines; in others the lines are not only more distinct, but are connected here and there by cross bands, and on the right hemelytron are joined before the apex by a curved band. It is possible that more than one species may be included, but as I have failed to find structural differences, I have not ventured to separate any but the following, and even it as only a more persistent variety.

23. *S. socialis*, var. *sobrina*.

Exemplis typicis similis sed paullo major ac dilutior; membrana sinistrorsa vix infuscata; femoribus posticis vix fusco-notatis.

Long. 3 mm.

*Hab.*—Uruçaca, Rio Juruá (November, 1874). Many specimens.

24. *S. seducta*, n. sp.

*S. sociali*, var. *sobrinae* persimilis, sed statura paullo majore, colore luteo-brunnea, et vertice paullo transverso videtur distincta.

Long. 3 mm.

*Hab.*—Rio Juruá (October and November, 1874). Many specimens, "at light."

It is with much hesitation that I have given this specific rank. At first sight it looks quite different from any form of *socialis*, but this is chiefly due to its yellow-brown colour and rather larger size. Beyond these there is no very tangible character by which to separate it. It is as variable as *socialis* in the markings of the hemelytra, these being in some examples almost unmarked, and in others adorned with longitudinal and transverse fuscous bands and lines of variable intensity. The head between the eyes seems to be more decidedly transverse than in *socialis*.

25. *S. simulans*, n. sp.

Fusco-brunnea, capite, pronoto, scutelloque disco dilutioribus; corpore subtus griseo-albido; clavo marginibus irregulariter, corio lineolis longitudinalis (in hemelytro dextro prope apicem anastomosantibus) area marginali maculis 3, membrana ad apicem corii macula 1 obscurioribus; membrana hemelytri sinistrorsi dilutissime brunneo-fusca; femoribus posticis subtus vitta longi-

tudinali et serie punctorum brunneis signatis; vertice transverse oblongo, margine postico longitudine media brevior.

Long.  $3\frac{1}{2}$  mm.

*Hab.*—Upper Amazon (October 13, 1874) and Tonantins (December 12, 1874). Three specimens.

In many respects like *S. socialis* but rather larger, hemelytra apparently thicker, and vertex differently shaped. Sometimes the frons has between the eyes two brown spots.

XXI. *Descriptions of new genera and species of Tenebrionidæ from the Island of Madagascar.* By  
FREDK. BATES.

[Read November 5th, 1879.]

DURING the past few years some extensive collections, abounding in novelties, have been received from the Island of Madagascar. Of the new *Tenebrionidæ*, two species have been described by C. O. Waterhouse in "Cistula Entomologica," Vol. 2, pt. xx. p. 365; and others have been briefly characterized by Fairmaire in the "Bull. Soc. Ent. de France, 1875," pp. xxxiii, xxxiv, and in "Petites Nouvelles Entomologiques," No. 173, June 1, 1877, p. 137.

In the following paper I have more fully described these latter, as well as all the remaining new species, the whole of which are contained in my own collection.

The collections formed at Antananarivo and Fianarantsoa are especially rich in the curious genus *Dolichoderus*, the number of species of which are here raised from six to seventeen. I have found it necessary to generically separate the Madagascar species that have hitherto been placed in the genus *Camaria*, which genus will, I believe, be found to be restricted to the New World.

I have also found it necessary to detach several members from the genus *Tetraphyllus*, and erect them into new genera.

It is much to be deplored that the practices of some describers are still very loose in regard to genera. Species from the most diverse parts of the globe are, on the assumption of mere superficial resemblance, thrown into genera to which they do not belong. Would they but give a little more time to an examination of generic characters, these errors would be avoided.

It will at once be seen how such careless work tends to vitiate all generalizations based on the geographical distribution of genera. It may, I think, always be regarded as a safe practice to endeavour to adjust generic limits to geographical habitats.

## NYCTEROPINÆ.

## DOLICHODERUS (Klug), Castelnau.

1. Body entirely black; eyes not laterally projecting beyond their orbit.
- A. Prothorax with a transverse impressed line near the base; basal margin not thickened .. .. 1. *acuminatus*, Klug.
- A.A. Prothorax thickly margined at the base.
- B. Elytra distinctly produced (mucronate) and divaricate at apex.
- C. Elytral mucro elongate, narrow, not impressed above; antennæ of sexes similar.
- a. Species smaller ( $7\frac{1}{4}$  lines), uniformly shining black; base of elytra keeled nearly up to the scutellum.  
2. *mucronatus*, n. sp.
- a.a. Species larger ( $8\frac{3}{4}$  lines), obscure black; base of elytra keeled only at the shoulders.  
3. *puncticeps*, n. sp.
- C.C. Elytral mucro short, broad, impressed above; antennæ of sexes dissimilar.
- b. Head and prothorax dull black; elytra gently convex, lustrous black .. 4. *politipennis*, n. sp.
- b.b. Uniformly black, a little nitid; elytra strongly convex, almost gibbous 5. *heterocerus*, n. sp.
- B.B. Elytra not produced, nor divaricate, at apex.
- D. Propectus not transversely grooved.
- E. Prothorax finely and more or less uniformly punctured.
- F. Prosternum distinctly impressed down the middle between the coxæ; anterior femora with a short tomentose line down the inner face in the ♂.
- c. Prothorax not tumid.  
6. *lucifugus*, n. sp.
- c.c. Prothorax tumid var. ? *tumidicollis*.
- F.F. Prosternum convex between the coxæ; anterior femora without tomentose line in the ♂.
- d. Prothorax with minute shining specks, or granules, scattered between the punctuation; lateral margins obsolete at the middle; episternum of mesothorax very feebly punctured; punctured lines on elytra very faint 7. *longicornis*, Fairm.
- d.d. Prothorax without minute shining specks between the punctuation; lateral margins entire; episternum of mesothorax coarsely punctured; punctured lines on elytra very distinct.  
8. *approximatus*, n. sp.
- E.E. Prothorax with a cluster of variolate punctures nearer the apex; sides subangulate near the base .. .. 9. *distinctus*, n. sp.
- D.D. Propectus with several broad deep transverse grooves in front of the prosternum; prothorax massive, parallel-sided, distinctly broader at apex than at base.  
10. *pectoralis*, n. sp.

2. Body black, tinged with æneous; eyes laterally projecting beyond their orbit .. .. . 11. *connexus*, n. sp.

3. Body partly or entirely of brilliant metallic colours.

G. Prothorax and elytra concolorous, or nearly so.

II. Elytra gently convex.

e. Species smaller (6 to  $6\frac{1}{4}$  lines); prothorax subcylindric; lateral margins obsolete; apical angle indistinct; eyes laterally projecting beyond their orbit; colour golden-brassy or brassy-green .. 12. *pulchripes*, n. sp.

e.e. Species larger (9 lines); prothorax narrowing anteriorly from behind the middle; lateral margins distinct throughout; apical angles distinct; eyes normal; colour golden-æneous, with strong violet reflections.

13. *atro-ænescens*, Fairm.

H.H. Elytra gibbous .. .. . 14. *gibbipennis*, n. sp.

G.G. Head and prothorax dull indigo-blue, or bluish-black; elytra glittering coppery-æneous.. 15. *dimidiatus*, C. O. Waterh.

*D. Klugii*, Casteln., is not known to me; judging from the brief description given it most nearly approaches *D. longicornis*, Fairm. *D. Klugii*, Sol., most nearly approaches my *D. mucronatus*, but it is very considerably larger, and (judging from the figure given) the apex of the elytra is more produced and much more strongly divaricate and pointed. Solier's species must be quite different from Castelnau's, as a comparison of the two descriptions, and the figure given by Solier, will amply prove.

I have not seen any species that will at all accord with Castelnau's description of *D. striatus*.

### *Dolichoderus acuminatus*, Klug.

This species may readily be distinguished from all the following by the head longer and more narrowed in front, and not squarely truncated on a level with the insertion of the antennæ; the prothorax not thickly margined at the base; the anterior femora in the ♂ broadly channelled and coarsely pilose on their inner face.

### *Dolichoderus mucronatus*, n. sp.

♀. Entirely (including legs and antennæ) black, very nitid; head quadrate, a little narrowed in front of the eyes, very broadly truncated in front, somewhat finely and not very closely punctured; epistoma extremely short, nearly smooth, the suture distinctly impressed: prothorax moderately convex; sides gradually (and slightly curvedly) expanded from apex to near the base, thence be-

coming more rapidly incurved: apex truncate, front angles small but distinct and acute; base distinctly wider than apex, broadly rounded; hind angles very obtuse; very finely and not closely punctured; lateral margins obsolete in the middle: elytra as wide at base as base of prothorax; gently convex; widest before the middle; strongly and somewhat sinuately attenuated behind; apex prolonged, forming a very distinct mucro, which projects beyond the abdomen by a length equal to the fourth ventral segment; finely seriate-punctate; intervals delicately alutaceous; base rather deeply emarginate, keeled at each side for more than half the width of each elytron, this keel strongly thickened at the shoulder, beneath which is a well-marked oblong depression rounded in front; humeral angle acute but not dentiform: prosternum distinctly impressed down the centre between the coxæ.

♂. Not known to me.

Long.  $7\frac{1}{4}$  lin.

Precise locality unknown.

*Dolichoderus puncticeps*, n. sp.

♀. Larger than the preceding and entirely opaque; head strongly and thickly punctured; epistomal suture obsolete; prothorax relatively shorter than in the preceding, more convex, and having several impressions along the base within the margin; lateral margins faint (except at the base) but visible throughout; base of elytra keeled only at the shoulders; elytral mucro as long as in the preceding, but more obtuse at the apex; prosternum convex between the coxæ; legs and abdomen shining black; antennæ pitchy black, and longer than in the preceding.

♂. Not known to me.

Long.  $8\frac{3}{4}$  lin.

Precise locality unknown.

*Dolichoderus politipennis*, n. sp.

♂. Head and prothorax dull black and obscurely punctured; elytra lustrous jet black and delicately seriate punctured; head quadrate, but little narrowed in front of the eyes; broadly and slightly sinuately truncated in front; epistomal suture well marked; antennary orbits rather convex, nearly smooth and shining; prothorax moderately convex; a narrow margin at apex and the thickened basal margin smooth and shining black; sides

slightly narrowing to the front from behind the middle; posteriorly more gradually curvedly contracted than in the two preceding species; base a little wider than apex, truncated, with an impression at the middle within the margin in front of the scutellum; lateral margins very faint except at the base; front angles very small and indistinct; elytra gently convex, as wide at base as base of prothorax; base but little emarginate, entirely keeled; humeral angle not prominent; sides channelled for a short distance from the humeral angle; strongly sinuately narrowed from behind the middle to the apex, which is strongly divaricate, the mucro being short, broadly rounded at apex, and distinctly impressed above; prosternum broadly and rather strongly impressed down the middle between the coxæ; antennæ and legs pitchy brown; the former elongate, flattened, perfoliate; joint 3 produced (but rounded) within at the apex, 4—6 broadly produced and angulate within, 7 less strongly so than 4—6; tibiæ, especially the front and hind, strongly thickened at the apex.

♀. Antennæ shorter; joints 3—7 obconic, scarcely perfoliate nor flattened; the tibiæ but little thickened at the apex.

Long.  $9\frac{1}{2}$  lin.

Fianarantsoa.

*Dolichoderus heterocerus*, n. sp.

♂. Near the preceding; head and prothorax less obscure, the elytra much less nitid; head more narrowed in front of the eyes, more sinuately truncated in front; antennary orbits more convex; sides of prothorax more parallel; elytra much more convex; the mucro shorter, less divaricate, scarcely impressed above; legs and antennæ of a clearer brown; the latter still more flattened, more perfoliate, the middle joints more produced on the inner side; 3 elongate securiform; 4—6 approaching wedge-shaped; prosternum irregularly sulcated between the coxæ.

♀. Antennæ and tibiæ as in the preceding.

Long. 8—10 lin.

Fianarantsoa.

*Dolichoderus lucifugus*, n. sp.

♂. Head and prothorax dull black; obscurely (sometimes obsoletely) punctured, the former a little narrowed

in front of the eyes; less squarely truncated in front, antennary orbits less convex, more rounded, and epistomal suture less strongly marked than in the two preceding species; prothorax very convex; slightly curvedly narrowed from behind the middle to the apex; base scarcely wider than apex, broadly rounded; front angles indistinct; lateral margins well marked; elytra not produced nor divaricate at apex, very finely seriate-punctate, of a more shining black than the head and prothorax; base arcuately emarginate; keeled only halfway across each elytron; humeral angle prominent and acute; sides not channelled near the base; abdomen shining black; episternum of mesothorax coarsely punctured; prosternum broad and impressed between the coxæ; legs and first 7 joints of antennæ shining pitchy-brown; joints 3—7 of antennæ obconic, not perfoliate; legs very stout, the tibiæ strongly thickened at the apex; anterior femora with a short tomentose line down their inner face.

♀. Antennæ and legs less robust; the former scarcely so long as in the ♂; the tibiæ not perceptibly thickened at the apex; the front femora without tomentose line down the inner face.

Long.  $7\frac{1}{2}$ —8 lin.

Fianarantsoa.

Var. ? *tumidicollis*.

This only differs in the larger, more tumid, and cushion-like prothorax; the stronger punctuation of the under surface; the prosternum not impressed between the coxæ; the femora rather strongly wrinkled on their underside; and the legs and antennæ of a more pitchy hue.

Long.  $8$ — $8\frac{3}{4}$  lin.

Fianarantsoa.

I have only seen the ♂.

*Dolichoderus longicornis*, Fairmaire.

Bull. Ent. Soc. de France, 1875, p. xxxiv.

Body entirely shining silky black; legs and antennæ shining pitchy-brown; head as in *D. lucifugus*, but the punctuation a little more distinct; prothorax rather strongly convex, but little narrowed anteriorly, base scarcely wider than apex; lateral margins visible only at base and apex; front angles small, subobtuse; base broadly rounded; finely and clearly but not closely punc-



ured, with numerous minute specks or granules scattered on the intervals; elytra gently convex; base emarginate, not keeled up to the scutellum; humeral angle prominent and acute; sides expanding to behind the middle, thence rather rapidly, but scarcely sinuately, narrowed to the apex, which is not produced nor divaricate; more or less finely seriate-punctate, the intervals minutely punctulate and sometimes delicately rugulose; abdomen shining black; episternum of mesothorax faintly punctured; prosternum not concave between the coxæ; legs and antennæ as in the preceding species, except that the anterior femora have not the tomentose line down their inner face.

The ♀ has the antennæ and legs less robust, joint 3 of the former shorter; and the tibiæ not thickened at the apex.

Long. 7—7½ lin.

Antananarivo.

*Dolichoderus approximatus*, n. sp.

Very near to the preceding, but the upper surface is not of a silky black; the antennary orbits are less prominent and more rounded; the head is more uneven, and the punctuation though shallow is large and coarse; the sides of the prothorax are a little more rounded, the lateral margins well marked throughout, and there are no minute bright specks or granules scattered between the punctuation; the elytra are a little less convex, the lines of punctures are rather coarse and are placed in lightly-impressed striæ; the intervals impunctate; and the episterna of the mesothorax are coarsely punctured.

Long. 8 lin.

Fianarantsoa.

*Dolichoderus distinctus*, n. sp.

Shining black, head short, broadly truncated in front, finely and obscurely punctured; prothorax very convex, a cluster of rather large shallow punctures on the disc nearer the apex than the base, the rest of the surface being very nitid and minutely and remotely punctulate; apex truncate, front angles not at all prominent; lateral margins distinct throughout; sides slightly and somewhat sinuately expanding from the apex to beyond the middle, thence

abruptly obliquely narrowed to the base; base not wider than apex; elytra gradually narrowing from behind the middle to the apex, which is not produced; finely seriate-punctate, intervals impunctate; base strongly emarginate, keeled only halfway across each elytron; humeral angle scarcely prominent; prosternum broadly sulcated between the coxæ; abdomen shining black; antennæ and legs shining pitchy-brown.

Long  $7\frac{1}{4}$  lin.

Antananarivo.

A single example, apparently a ♀.

*Dolichoderus pectoralis*, n. sp.

Head and prothorax dull black; the former very short, obsolete punctured, sinuately truncated in front; antennary orbits very obliquely rounded; prothorax massive, unequally convex, quadrate, sides subparallel, obliquely narrowed at base and apex; apex distinctly broader than base, front angles not at all prominent, lateral margins very distinct throughout; indistinctly punctured and closely minutely granulose; elytra shining black, gently convex, gradually tapering from behind the middle to the apex, which is not produced; base arcuately emarginate, and keeled nearly up to the scutellum; humeral angle prominent and acute; delicately seriate-punctate, the intervals very finely alutaceous and very minutely granulose; prosternum wide and concave between the coxæ; propectus with three or four strong transverse grooves or channels in front of the prosternum; abdomen shining black; legs and antennæ shining pitchy-brown.

Long. 9— $10\frac{1}{2}$  lin.

Antananarivo.

*Dolichoderus connexus*, n. sp.

Bronzed-black, shining on the elytra; head and prothorax finely but distinctly punctured; the former broadly truncated in front; epistomal suture well marked; antennary orbits convex and smoother and more nitid than the rest of the head; eyes prominent, projecting laterally beyond their orbit; prothorax rather strongly convex, subquadrate, sides more contracted at base than at apex; front angles not at all prominent; base broadly rounded; lateral margins obsolete except at the base; elytra gently

convex, finely and irregularly seriate-punctate, narrowing from behind the middle to the apex, which is slightly divaricate but not produced; base arcuately emarginate, keeled only at the shoulders; humeral angle not prominent; legs shining pitchy-brown; antennæ reddish-brown.

The ♂ has the hind tibiæ a little flexuous and thickened at the apex.

Long. 5—5½ lin.

Antananarivo.

*Dolichoderus pulchripes*, n. sp.

Golden-brassy or brassy-green, excepting the head, which is darker and duller; the apex of the elytra tinged with violet colour. Head broadly sinuately rounded in front, finely, closely and rugosely punctured; epistomal suture well marked; antennary orbits prominent; eyes projecting laterally beyond their orbit; prothorax rather strongly convex, subcylindric, a little narrowed anteriorly from behind the middle; front angles not at all prominent; base broadly rounded; lateral margins obsolete; finely and not at all closely punctured; elytra as in the preceding species, except that the apex is a little produced and the base is keeled nearly up to the scutellum; legs of a lovely metallic-violet colour; antennæ reddish-brown.

The hind tibiæ in the ♂ are very distinctly flexuous, and thickened at the apex.

Long. 6—6¼ lin.

Antananarivo.

*Dolichoderus gibbipennis*, n. sp.

Dark æneous, shining on the elytra. Head and prothorax very finely and not at all closely punctured, the former broadly (but not sinuately) rounded in front; epistomal suture rather faintly marked; antennary orbits moderately convex, obliquely rounded, nearly smooth and shining; eyes normal; prothorax subcylindric, slightly contracted at base and apex; base and apex of about equal width; front angles not at all prominent; base somewhat sinuately truncated; lateral margins well marked at the base; elytra ovate, gibbous, sharply attenuated behind, the apex a little produced but not divaricate; finely seriate-punctate; base arcuately emarginate and entirely keeled;

underside dark shining æneous; legs and antennæ pitchy-brown.

Long.  $6\frac{2}{3}$  lin.

Antananarivo.

I know only the ♀.

*Dolichoderus atro-ænescens*, Fairmaire.

This species—briefly characterized by Fairmaire in the “Petites Nouvelles Entomologiques,” June 1, 1877, No. 173, p. 137—is of a beautiful golden æneous, strongly suffused with violet colour, most nitid on the elytra.\* The head is rather strongly, closely and slightly rugosely punctured; the epistoma is convex, its suture well marked; antennary orbits moderately convex and narrowly rounded; eyes normal; the prothorax is convex, rather finely and closely punctured and faintly rugulose; the sides are but little narrowed anteriorly; the base is wider than the apex; the lateral margins are faint but visible throughout; the front angles prominent and acute; the elytra are gently convex, widest before the middle, the apex a little produced and slightly divaricate; the lines of punctures are fine, somewhat irregular, and are placed in very lightly-impressed striae, the intervals being very delicately rugulose; the legs are pitchy-brown, with a tinge of violet colour on the femora.

Long. 9 lin.

Precise locality unknown.

*Nycteropus lævisternus*, Fairmaire.

“Pet. Nouv. Ent.” No. 173, June 1, 1877, p. 137.

Very near *N. anthracinus*, Klug. The form is relatively narrower, more cylindrico-elliptic; the sides of the prothorax more gradually narrowed anteriorly; the lateral margins apically more expanded and flattened; the base more strongly bisinuate, so that the angles appear more prolonged, and repose on the shoulders of the elytra; scutellum less rounded behind; the lines of punctures on the elytra are almost obsolete, but the intervals are distinctly punctulate and very delicately rugulose; the legs are stouter and are violet-black, the upper surface is entirely dark shining green, the underside shining black;

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\* M. Fairmaire has it “*supra niger, obscure cyanescens, modice nitidus.*” Suspecting the colours to be obscured by stains, I gave the specimen a bath of chloroform, when the true colours became revealed.

the prosternum is broadly impressed between the coxæ, broadly and squarely truncated behind, with the angles a little turned up.

Long.  $7\frac{1}{2}$  lin.

Precise locality unknown.

It appears to me that there are two species of *Nycteropus* confounded in collections under *N. anthracinus*, Klug.

In the one (*N. anthracinus*, Klug) the colour is shining black, usually with a tinge of green or dark blue; the head more strongly and rugosely punctured, the groove at each side less clean and distinct; the epistomal suture faint but visible; the prothorax a little less convex, and less rounded at the sides behind the middle; the elytra are not so convex at the base, and the sides are more obliquely narrowed behind; the flanks of the mesothorax are distinctly rugose punctate; the prosternal process is nearly plane, and is very distinctly prolonged and somewhat broadly truncated behind.

Long.  $7\frac{1}{2}$ — $10\frac{1}{4}$  lin.

In the other (*N. confusus*, n. sp.) the colour is entirely shining black; the head finely and not at all rugosely punctured; the groove at each side is clearly and deeply impressed and extends nearly up to the anterior border; the epistoma is completely confounded with the front; the flanks of the mesothorax are quite smooth; the prosternal process is not produced and is rounded behind, and there is a well-defined groove extending round the sides of its hinder half and partly inclosing a well-marked round depression.

Long.  $7\frac{1}{4}$ — $8\frac{1}{2}$  lin.

### CNODALONINÆ.

Three out of the following four new genera have hitherto been confounded with *Camaria*. They may all at once be distinguished from that genus by the epipleural fold of the elytra rapidly expanded at the base, completely attaining the humeral angle.

#### PSEUDOCAMARIA, nov. gen.

Mentum trapezoidal, strongly convex down the median line, not notched in middle of front margin; last joint of

maxillary palpi broadly securiform; mandibles curved at outer edge; head rhomboidal; front gently declivous to the epistoma; epistoma broadly and deeply emarginate in front, the suture well arched and very strongly impressed; antennary orbits angulate, reflexed; eyes large, reniform, not depressed above, not laterally projecting; antennæ as long as the head and prothorax; joint 3 elongate, obconic; 4 obconic but much shorter and stouter than 3; 5 broader than 4 and subtriangulate; 6—10 still larger and wider, depressed, subequal, not transverse, a little contracted basally, squarely truncated at apex; 11 larger than 10, obliquely rounded at apex; prothorax transverse, but little convex, entirely margined save the apex at the middle; lateral margins strongest, a little reflexed and feebly crenulated; apex arcuately emarginate, front angles obtuse; base broadly lobed in the middle; sides curvedly contracted anteriorly, subparallel posteriorly; hind angles acute and outwardly directed; scutellum curvilinearly triangular; elytra considerably wider than prothorax, almost gibbous (*alternata*), or gently convex (*consobrina*); a little dilated behind the middle; shoulders broadly rounded; apex (conjunctly) narrowly rounded; epipleural fold entire behind, rapidly expanded at the base and reaching up to the humeral angle; prosternum strongly compressed before the coxæ, as if longitudinally keeled; the process horizontal, triangulate and acutely pointed behind, not deeply penetrating the mesosternal cavity, which is in form of an open U, having its sides vertical, and horizontal on the top; intercoxal process curvilinearly triangular, but not pointed at the apex; legs, especially the anterior, elongate, slender; front tibiæ a little flexuous; 1st joint of hind tarsi as long as 2nd and 3rd together; the last as long as the three preceding united.

Type. — *Camaria alternata*. Fairmaire, Bull. Soc. Ent. de France, 1875, p. xxxiii.

*Pseudocamaria consobrina*, n. sp.

Easily distinguishable from *alternata* by its more oblong form; the elytra regularly convex, the intervals being more (♂) or less (♀) strongly transversely rugose, the colour (of the elytra) green, or brassy-green, running into golden and purple on the sides, base and apex. Head and prothorax dull purplish-black, the former finely, clearly and remotely punctured; the punctuation on the latter is larger and closer but more obscure; joints 5—10

of the antennæ are more contracted at the base, on the inner side; the sides of the prothorax are less strongly, and more obliquely, contracted anteriorly, a little dilated posteriorly, the margins less distinctly crenulated; the prosternal process is more convex, and is not pointed behind; the punctuation, &c. on the abdomen and flanks of metasternum is stronger; the pro- and meta-sterna are shining black, without any tinge of violet; the femora are bluish-black; the tibiæ, tarsi and antennæ reddish-brown, clearest on the former. In *alternata* the pro- and meta-sterna are black, with distinct violet reflections; the femora cyaneous, the tibiæ nearly of the same colour.

The ♂ is narrower than the ♀; joints 6—10 of the antennæ distinctly narrower; the apical emargination of the epistoma distinctly angulate; the intervals on the elytra more coarsely rugose, and the prosternal process more lobiform, and obtuse, behind.

Long.  $10\frac{1}{2}$  lin.

Fianarantsoa.

In the following three genera the eyes are more or less depressed above, and are laterally very prominent; the prothorax strongly transverse and quadrate, the front angles prominent; and the epipleural fold of the elytra does not extend beyond the level of the fourth ventral segment.

#### ACTANORIE, nov. gen.

Mentum trapezoidal, finely carinate down the median line, anterior margin entire; mandibles curved at the outer side; head short, front rapidly sloping to the epistoma; this latter broadly truncated in front, the suture angulate, strongly impressed; eyes a little depressed above; the antennæ and palpi are wanting in the unique example before me; prothorax unequally convex; apex subsinuate emarginate, front angles large and prominent but obtuse; all the margins reflexed, the lateral irregularly crenulated; base feebly bisinuate, hind angles obtuse; sides very feebly rounded in the middle, sinuate contracted at the base; scutellum curvilinearly triangular; elytra considerably wider than prothorax; strongly convex, sides a little dilated behind, entirely margined and reflexed; apex (conjointly) narrowly rounded; shoulders broadly rounded, prominent; the surface (excepting the sutural region at the base) uneven by reason of numerous large foveæ; prosternum strongly abbreviated before, and

not abruptly elevated between, the coxæ; the process horizontal, lanciform, bisulcate between the coxæ; mesosternum horizontal, vertical in front, the cavity V-shaped; intercostal process triangular and narrowly rounded at apex; legs less elongate than in the preceding genus; tarsi wanting.

Type.—*Camaria undaticollis*. Fairmaire, Bull. Soc. Ent. de France, 1875, p. xxxiii.

#### THETTEA, nov. gen.

Mentum trapezoidal, regularly convex, not keeled down the median line; epistoma broadly truncated in front, the suture angulate and strongly impressed; front somewhat rapidly sloping to the epistoma; antennary orbits prominent; antennæ rather short and slender, thickening outwardly, scarcely depressed; joints 3—7 obconic; 3 elongate; 4—6 subequal in length, but gradually broader; 8—10 still larger and wider, subtriangular; 11 twice the length of 10, apex obliquely rounded; prothorax but little convex, well margined throughout except at the middle of the apex; lateral margins entire; front angles distinctly sharper than in the preceding genera; sides slightly, and obliquely, widened to behind the middle, thence obliquely narrowed to the base; base feebly bisinuate, hind angles subrectangular; scutellum curvilinearly triangular; elytra much broader than the prothorax, gently and regularly convex, dilated posteriorly; shoulders prominent, broadly rounded; prosternum abbreviated before, and abruptly elevated between, the coxæ; the process rather short, lanceolate; mesosternum vertical in front, its cavity widely U-shaped; apex of intercoxal process narrowly rounded; legs slender; tarsi very long and slender, the three first joints of the anterior dilated; the last joint of the posterior not equal in length to the three preceding united.

#### *Thettea tenuitarsis*, n. sp.

Head and prothorax bronzy-black, finely, obscurely and remotely punctured; scutellum black; elytra brilliant coppery-æneous on the intervals, vivid green down the striae; strongly striated, the striae closely set with very distinct, clearly impressed, rounded punctures; intervals equal, moderately convex, impunctate, delicately rugulose; underside black, moderately nitid; epipleural fold with two or three irregular rows of very distinct punctures down



the middle; flanks of metasternum feebly punctured; abdomen minutely punctured and finely longitudinally striolate; legs and antennæ chestnut-brown, the tibiæ finely and not closely punctured.

Long.  $6\frac{1}{2}$ —7 lin.

Antananarivo.

#### DROCLEANA, nov. gen.

Mentum strongly projecting at the middle, strongly tricarinate, notched at apex; last joint of maxillary palpi subcultriform; mandibles robust, strongly angled at the outer side; eyes rather strongly depressed above; antennæ about equal in length to the head and prothorax; joints 1—6 obconic; 3 elongate; 4—6 gradually shorter and stouter; 7—10 much larger and broader, depressed, subtriangulate, slightly perfoliate, inner apical angle a little produced; 11 much longer than 10, broadly rounded at apex; head large, gently and regularly declivous to the anterior border; trapezoidal in front; sides of epistoma and antennary orbits continuous; epistoma broadly and feebly emarginate in front; the suture angulate and lightly impressed; antennary orbits obtusely rounded, but little elevated; prothorax broadly emarginate at apex, front angles prominent, obtuse; base feebly bisinuate, hind angles rectangular; lateral margins a little reflexed, thickening apically; front and hind margins faint, obsolete at the middle; scutellum triangular; elytra very large, oblong, convex, laterally compressed; a little dilated posteriorly; shoulders obtusely rounded; prosternum not abbreviated before, nor abruptly elevated between, the coxæ; the process narrow, trisulcate between the coxæ, smooth and broadly triangulate behind, not deeply penetrating the mesosternal cavity, which is in the form of an open V; intercoxal process broadly rounded in front; legs rather long and slender; last joint of hind tarsi equal in length to the three preceding united.

Type.—*Camaria chalconota*, Klug.

To this genus also belong *Camaria violaceipennis*, C. O. Waterhouse, and *C. parvicollis*, Fairmaire.

*Drocleana (Camaria) parvicollis*, Fairm., "Pet. Nouv. Ent.," No. 173, June 1, 1877, p. 137.

Smaller than *chalconota*; less convex; the elytra dark reddish-brown, or brunneus, tinged withaneous; not

laterally compressed, more gradually declivous behind, the striæ much less distinctly punctured, the intervals more convex and a little more strongly punctured; head finely but much more distinctly punctured; the prothorax is relatively smaller, not at all rounded at the sides, the apical angle more acute, less obscurely punctured; the outer joints of the antennæ are narrower, 7—10 not apically produced at the inner side; prosternal process more horizontal, more compressed behind the coxæ; intercoxal process much less broadly rounded at apex.

Long.  $14\frac{1}{2}$  lin.

*Porphyryha*, Fairm. l. c. p. 137.

Mentum trapezoidal, pilose, finely carinate down the median line, not notched in front; last joint maxillary palpi cultriform; head strongly transverse, much narrowed in front of the eyes, sides slightly curvedly contracted to the anterior angles; epistoma broadly and squarely truncated at apex, the suture arched and very strongly impressed; front a little convex; eyes large, broad, obliquely produced above, nearly attaining the epistomal suture; antennæ longer than head and prothorax; joint 3 elongate obconic; 4—6 gradually shorter and wider; 7—11 much wider, strongly depressed, rather densely clothed with short decumbent black hairs, triangulate (except 11) and becoming gradually more transverse; 11 largest and broadly rounded at apex; prothorax trapeziform, finely margined throughout, apex feebly arcuately emarginate, the angles acute; base bisinuate, produced in the middle, forming a distinct lobe in front of the scutellum; hind angles rectangular, a little depressed; scutellum rather large, as long as it is wide at the base, curvilinearly triangular; elytra much wider than the prothorax, appearing subquadrate, gibbous, shoulders very prominent, with a depression behind; base sinuately emarginate; sides broadly rounded at the shoulders, subparallel behind them to behind the middle, thence rapidly contracted to the apex; prosternum a little abbreviated and slightly compressed before, and not abruptly elevated between, the coxæ; the process very wide, flat, horizontal, broadly rounded behind, and closely fitting into a corresponding cavity in the mesosternum; this latter short, horizontal, vertical in front; intercoxal process broad, arching to the apex, which is very narrowly rounded;

epipleural fold of the elytra abbreviated behind, expanding to the shoulders, the outer edge sinuate; legs slender, thighs parallel, tibiæ straight; first joint of middle and hind tarsi long, in the latter longer than the last joint.

*Porphyryba violaceicolor*, Fairm. l. c. p. 137.

Above entirely (except the scutellum, which is cyanous) of a beautiful shining purplish-violet, with golden reflections; head and prothorax finely and not at all (except on the epistoma) closely punctured; scutellum finely longitudinally keeled, irregularly punctured; elytra regularly punctate-striate, the striæ very lightly impressed, the punctures very distinct, rounded, closely set; intervals equal, plane, finely and not closely punctured; underside, legs, antennæ and oral organs, black; femora and tibiæ closely and distinctly punctured.

Long. 6 lin.

*Tetraphyllus*, Cast. et Brullé.

This genus stands greatly in need of revision. I do not here enter into the question raised by Dr. Mäklin (who places the species ordinarily recognized as belonging to *Tetraphyllus* under *Damatris*), because it is not yet clearly ascertained what would come under *Tetraphyllus* as recognized by him. I have in my possession specimens obtained from old French collections (I believe from M. Reiche's), labelled "*Tetraphyllus Reaumuri*, Cast.," and "*Tetraphyllus Latreillei*, Lap. et Brullé," the former being *Hemicyclus grandis*, Hope, and the latter a species of *Artactes*, Pascoe. However this may be, there is no doubt that the list given in the Munich Catalogue (p. 1997) represents a heterogenous assemblage of diverse generic forms; and I offer no apology for making the new genera that follow.

Taking *formosus* as the type of the genus *Tetraphyllus*, we find the mentum (when dissected out) to be trapezoidal (*i. e.*, apex wider than base and sides sloping), very prominent and convex, but scarcely carinate down the centre, and impressed at each side; there is also a distinct, fine short carina at each side, obliquely directed from the apex to the middle of the sides, the space beyond this, forming the anterior angles, being inflected; last joint of maxillary palpi subcultriform; antennæ with the five last articles a little depressed, gradually larger, subtriangulate (except

the last), apically a little produced, but rounded, within; eleven a little larger than ten, ovate; labrum but little extruded, the membranous hinge scarcely visible; head rather large, not strongly transverse, not narrowed nor shortened in front of the eyes, deeply imbedded in the prothorax, perfectly plane, or flattened, and gradually sloping from the vertex to the anterior border; a well-marked longitudinal furrow extending down the middle of the front and nearly across the epistoma; antennary orbits not prominent (convex), obliquely rounded, the sides continuous with the sides of the epistoma; this latter rapidly narrowed to the front, the angles rounded and convex above,\* the apex lightly emarginate, the suture angulate, faintly impressed, and terminating at each side at some distance from the apical angle; eyes above large, rounded, not at all depressed, not projecting, nor forming a conical outline, laterally; the head, behind the eyes, being abruptly and strongly contracted; prothorax very finely punctured, strongly transverse, deeply arcuately emarginate in front, front angles scarcely depressed; base much wider than apex, sides a little curvedly contracted at the base, the apex as strongly margined as the sides; the sides of the elytra are somewhat rapidly, curvedly expanded direct from the basal angle; the flanks of the prothorax and of all the sterna, and the epipleural fold, are perfectly smooth and impunctate; the prosternum is abbreviated before, and is abruptly elevated between, the coxæ, but this abbreviation does not extend nearly up to the coxæ; the prosternal process is moderately wide, prolonged and gradually tapering behind; intercoxal process wide, apex broadly rounded.

There may be slight modifications of the above characters in some of the species, but nothing that will at all affect or lead to the confounding of them with any of the following new genera.

*Tetraphyllus pyropterus*, Fairm. l. c. p. 137.

Very near *formosus*, from which it differs in being smaller, the elytra a little more gibbous, and having a more rounded outline, the colour bright coppery, with scarcely a tinge of green; the antennary orbits a little

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\* In some species (*acerbus*, Coq., &c.) the front angles of the epistoma are elevated, forming a large, blunt, recurved tooth, the space between being rather deeply, arcuately emarginate. Perhaps this may be sexual.

angled at the sides at their junction with the epistoma; this latter having the front angles toothed (or tubercled), and strongly emarginate between; underside less opaque; and the prosternal process smoother.

Long.  $5\frac{1}{4}$  lin.

*Tetraphyllus Fairmairii*, n. sp.

Smaller and more oblong-ovate than *formosus*; the sides of the elytra more gradually rounded from the basal angle, more dilated posteriorly; the convexity on the back extending nearer to the apex; the elytra are consequently more abruptly declivous behind; the striæ much more deeply impressed, the fourth and fifth uniting much nearer the apex; the intervals more convex and finely but distinctly punctured; underside more nitid; prosternal process more sharply tapered behind, the sides completely sulcated near the margin, an oblong depression between the coxæ.

Long.  $5\frac{3}{4}$  lin.

The elytra more swollen behind will also serve to distinguish this species from *acerbus*, Coq.

*Tetraphyllus tuberculipennis*, n. sp.

Very distinct from any of the described species by the elytra gently and regularly convex; the intervals terminating apically in oblong tubercles.

Head and prothorax dull black; epistoma scarcely emarginate in front, the suture arched and plainly impressed; frontal furrow not extending beyond the epistomal suture; head very finely and remotely punctured; prothorax ample, but little convex, finely and not closely punctured, very deeply arcuately emarginate in front; front angles not acute; base very feebly bisinuate; sides rather strongly curvedly contracted anteriorly, very feebly narrowed at the base; scutellum shining black; elytra broadly oval, regularly and not at all strongly convex, gradually declivous behind; sides regularly and gently rounded from the basal angle to near the apex; finely and cleanly striated, the striae uniting by pairs at the base; five and six abbreviated and terminating at the intrahumeral depression; posteriorly the first striae extends to the apex, two and three are united higher up, whilst four and five, six and seven, eight and nine unite

by pairs at some considerable distance from the apex; the intervals are equal, very remotely punctulate, and show traces of a keel down their middle, and terminate in a well-marked more or less oblong tubercle; the sutural interval is continued along the base to the fifth, the elytra being basally depressed immediately behind it; the colour is vivid metallic-green, and brilliant coppery in alternate longitudinal stripes, but less clearly defined than in *acideferus*, Coq.; underside dull black; legs chestnut-red; antennæ a little paler; prosternal process lanceolate, thickened at the margins and sulcated at each side.

Long.  $3\frac{1}{4}$ —4 lin.

Antananarivo.

#### CHEMOLANUS, nov. gen.

Differs from *Tetraphyllus* in having the mentum distinctly carinate down the median line, front angles not inflexed; head much shorter, especially in front of the eyes; the front convex and rapidly sloping to the epistoma; this latter smaller, convex, very broadly truncated in front, the suture strongly arched, very deeply and strongly (especially at the middle) impressed, and terminating at each side at the anterior border at the point where the truncation of the epistoma ends. Antennary orbits convex; eyes distinctly depressed above, laterally more prominent and showing a conical outline; there is also a well-marked groove bordering their inner edge; prothorax less transverse, trapeziform, much less deeply emarginate in front; front angles less acute, depressed; sides obliquely narrowed from base to apex, not rounded nor incurved at the base; lateral margins much finer; base and apex indistinctly margined at each side, not at all at the middle; prosternum shorter, abbreviated nearly up to the coxæ; the process very much wider, plane, broadly triangulate behind, and rather closely fitting into a corresponding cavity in the mesosternum; intercoxal process more narrowly rounded at apex.

It may be added that the membranous hinge of the labrum is largely exposed, forming, with the labrum itself, a sort of muzzle.

The head is of precisely the same form, &c. as in the genus *Camariodes*.

Type.—*Tetraphyllus consobrinus*, Fairm.

## CHARIANUS, nov. gen.

Differs from *Tetraphyllus* in the mentum strongly and more regularly convex, not at all carinate; the larger and more extruded labrum, the membranous hinge entirely visible; head much narrowed and shortened in front of the eyes, and swollen behind them; eyes above narrower, inwardly prolonged and contracted, more distant from the prothorax; antennary orbits smaller, more convex, more rounded; epistoma convex, broadly and squarely truncated in front, front angles distinct, sides short but distinct and not continuous with the sides of the antennary orbits; the suture strongly transversely impressed and sending off at each side, at an obtuse angle, a more finely-impressed line, which terminates at the junction of the antennary orbits with the sides of the epistoma; prothorax squarer, much less deeply emarginate in front, front angles more obtuse; base more bisinuate, not much wider than the apex; sides much more gradually expanded to behind the middle, thence more strongly, abruptly and incurvedly contracted to the hind angles; side margins a little reflexed and finely crenulate; apical margin very fine, almost obsolete; elytra obliquely widened from the base to the shoulder where they become angulate; sides distinctly compressed, and subparallel, at the middle, dilated behind; the striæ very distinctly punctured; epipleural fold not rapidly expanded at the base, not nearly attaining the humeral angle; prosternum abbreviated direct up to the coxæ; the process shorter and acutely triangular; intercoxal process much narrower; triangular, pointed at apex.

It may also be added that the head, the prothorax and its flanks, are closely studded with deeply and clearly impressed, rounded punctures: the flanks of the meso- and meta- sterna, the epipleural fold and the legs are also very distinctly punctured, the latter somewhat densely so.

Type.—*Tetraphyllus purpuratus*, Coq.

## AMARSENES, nov. gen.

Head as in the preceding genus, but the eyes above are not perceptibly contracted: the antennæ\* are very short;

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\* In my examples of *Charianus*, the antennæ are, unfortunately, wanting.

joints 3—5 obconic; 3 elongate; 4—5 gradually shorter; 6—10 slightly depressed, triangulate, subserrate within, becoming gradually shorter and broader; 11 larger, obliquely rounded. The prothorax is more curvedly contracted anteriorly; gradually, and but very slightly, narrowed posteriorly; apex more sinuately emarginate; side margins broader, more reflexed, not crenulate at the edges; the elytra are much more oblong, more gradually declivous behind; sides gradually expanding direct from the base to near the apex; epipleural fold as in *Tetraphyllus*. The prosternum and its process and the intercoxal process do not materially differ from the same parts in *Charianus*, like which genus, too, the head, prothorax and the flanks beneath, are (but less thickly) studded with well-marked rounded punctures.

*Amarsenes (Tetraphyllus) oblongo-camelus.* Fairmaire, l. c. p. 137.

Oblong-ovate; head and prothorax obscure æneous with purplish reflections; brighter and cærulescent on the front part of the former; elytral intervals brilliant coppery æneous, rather broadly cærulescent down the striæ; head rather finely and not densely punctured, faintly transversely impressed between the eyes; prothorax more strongly punctured and having several light irregular depressions along the base, on the sides and at each side of the disc; lateral margins reflexed, dark blue, shining; scutellum elongate, bright cyaneous, with several transverse impressions on the sides; elytra gibbous on the middle, shoulders scarcely prominent, sides a little compressed at the middle, dilated behind; broadly striated, the striæ closely set with fine transverse punctures which become rounded towards the apex of the elytra; the second and seventh striæ unite close to the apex three to six, and four to five, unite at gradually receding distances; basally only one to two and seven to eight are united; there is also the usual short stria by the scutellum; the intervals are moderately convex and nearly smooth; metasternum and abdomen brilliant golden æneous, the latter suffused with purple; prosternal process shining black, smooth, a little bent down and compressed behind the coxæ; legs and basal joints of antennæ shining cyaneous; the former very distinctly punctured.

Long. 9 lin.



*Nesogena gigantea* (Fairm. i. l.), n. sp.

Oval-elliptic; greenish-bronzed or brown-bronzed, less nitid on the prothorax; head bluish-green and coppery, very nitid, irregularly punctured, a groove at each side the front connected posteriorly (between the eyes) by an arched impression; prothorax moderately convex, feebly emarginate in front, sides very strongly curvedly expanded from the apex to behind the middle, thence subparallel to the base; front angles obtuse, the hind directed backwards; moderately and irregularly punctured, most closely so on the sides, smooth down the median line; lateral margins rather broad, bluish, coarsely rugose-punctate; the usual coarsely rugose-punctate line across the middle of the base, close to the margin; scutellum blue, punctured, triangular with the sides sinuate; elytra ample, moderately convex, broadest before the middle, a little narrowed behind, apex (conjointly) rather broadly rounded, sides broadly margined, bluish, a little sinuous, and narrowing at base and apex; punctate-striate, the striæ well marked, the punctures very small, except at the base, and crenating the sides of the intervals; these are convex, finely punctured, delicately alutaceous, most closely so at the sides: underside more or less bright coppery-æneous; flanks of prothorax longitudinally undulately wrinkled; prosternum horizontal, produced and narrowly conical (mucronate) behind; legs bluish-black; antennæ long, tapering outwardly, the basal joints dark shining brown, the rest paler.

Long. 12—12½ lin.

*Nesogena speciosa*, n. sp.

Near *Batesii* (Fairm. Stett. Ent. Zeit. 1875, p. 190), but smaller; the prothorax chalybeate-blue, sometimes blended with violet, more strongly and more closely punctured, the transverse basal impression shallower; the sides more abruptly (less curvedly), narrowed anteriorly; the elytra brilliant (especially in the ♀), purplish-coppery, becoming golden-æneous at the margins, base, suture and down the striæ; the striæ distinctly broader, more strongly crenating the sides of the intervals; legs and basal joints of antennæ uniformly dark shining brown.

These differences appear slight, but they are constant throughout a series of examples.

The ♂ has the form more oblong, the antennæ longer, the intervals on the elytra rougher, and the femora are all pilose beneath on their basal half.

Long. 10 lin.

Antananarivo.

*Nesogena rutilia* (Fairm. i. l.), n. sp.

Also near *Batesii*, but the form is much more oblong and parallel; the prothorax metallic coppery-æneous, more or less tinged with purple, especially at the sides; sides more obliquely narrowed anteriorly; the elytra narrower, more parallel, of a bluish-violet colour, or bluish-green, passing into palish-purple at the base, sides and suture; the reflexed margins golden with purplish reflections, narrower, not sinuous nor distinctly expanded at the middle.

The ♂ has the intermediate femora only pilose beneath.

Long.  $10\frac{1}{2}$  lin. Width of elytra across the middle  $4\frac{1}{2}$  lin.; in *Batesii* they are  $5\frac{1}{3}$  lin. across.

*Nesogena lucida*, n. sp.

Near *speciosa*, but smaller, more elliptic, much less convex, still more (especially the prothorax) brilliant, the basal angles of the prothorax produced, acute and outwardly directed.

Head brilliant emerald-green, finely and not closely punctured; epistomal suture and the furrow at each side the front strongly marked, these latter not distinctly connected behind; prothorax golden-brassy, of the most intense brilliancy, entirely (and broadly at the sides) bordered with emerald-green, which border is inwardly finely edged with blue and purple; minutely and remotely punctured, transversely wrinkled at the sides, close to the margin; the usual furrow along the middle of the base; hind angles produced, acute, outwardly directed; scutellum bluish-green, irregularly punctured; elytra very feebly convex, golden-coppery on the back, passing into a beautiful palish-purple with violet reflections on the sides and apex, the outer interval and the lateral margins of a brilliant emerald-green; sides sinuate, broadly margined, expanded at the middle; punctate-striate, most strongly so at the sides and apex, where also the intervals are narrower and somewhat convex; intervals minutely punctulate and indistinctly alutaceous; underside brilliant

metallic golden-green, suffused with purplish-coppery at the sides; legs and antennæ shining chestnut-brown; labrum dull reddish-brown; prosternum not distinctly produced, nor narrowly conical, behind, as it is in all the preceding species.

Long.  $8\frac{1}{2}$  lin.

Coquerel, in the description of his *N. (Adelphus) Guérinii*, gives the legs and antennæ as obscure bronzed-violet, the prothorax very convex and very brilliant, with the hind angles directed backwards; the elytra very convex, and very brilliant coppery-red.

*Nesogena venusta*, n. sp.

Ovato-elliptic; very gently convex; elytra greenish coppery-brown passing into purplish-brown at the sides and apex; head and prothorax fiery-purple with green reflections, the sides of the latter distinctly green; head finely remotely punctured, the groove at each side the front not at all connected behind; prothorax minutely remotely punctured, the sides narrowing in a curve from base to apex, more rapidly so at the apical half; hind angles not produced nor outwardly directed, base very gently bisinuate; sides rather finely margined, and not coarsely punctured nor rugose immediately within the margin; scutellum of the same colour as the prothorax, finely punctured, acutely pointed behind; elytra large, much broader than the prothorax, gently convex, sides moderately margined, not sinuate, scarcely rounded at the middle; rather finely but somewhat deeply punctate-striate, intervals convex, finely and remotely punctulate, and rather closely alutaceous; underside brilliant bluish-green and purple; femora shining reddish-castaneous, the base and apex metallic-green reflecting purple; tibiæ purplish-violet, the base and apex metallic bluish-green; 1st joint of the tarsi and basal joints of antennæ metallic-purple; prosternal process a little produced and rounded behind.

Long.  $9\frac{1}{2}$  lin.

*Nesogena Fairmairii*, n. sp.

Oblong-elliptic; moderately nitid; of a beautiful silky bluish-green, slightly bronzed down the back and on the prothorax; the margins of the prothorax, the base, suture and lateral margins of the elytra, violaceous; head

rather strongly punctured, more or less rugosely so between the eyes, the impressions at each side the front distinctly connected behind; prothorax moderately convex, of the same form as in *gigantea*, but the base is a little more sinuate, the punctuation irregular but rather large, lightly but distinctly impressed down the median line; scutellum blue, or bluish-black, acutely pointed behind, impressed down the middle at the base; elytra moderately convex, oblong oval; sides scarcely sinuate, not broadly margined; moderately punctate-striate, the intervals a little convex, sparsely and very minutely punctulate and delicately but rather closely alutaceous; underside brilliant golden-green; legs and basal joints of antennæ dark shining chestnut-brown; prosternal process as in *gigantea*. All the femora fringed beneath in the ♂.

Long. 10 lin.

Fianarantsoa.

*Nesogena castaneipes*, n. sp.

Similar in coloration to *Fairmairii*, but more æneous, the prothorax relatively longer and narrower, the sides expanded from the apex to nearer the base, thence parallel to the hind angles; base scarcely at all sinuate; the elytra less oblong, more rounded at the sides, more convex, especially near the base; the prosternum closely curved round the coxæ; and the size much smaller.

Head finely irregularly punctured, not very closely nor rugosely so on the front, the groove at each side indistinctly connected behind; prothorax punctured as in the preceding; scutellum blue, pointed behind, punctured; elytra rather finely but somewhat deeply punctate-striate, the intervals rather convex, less closely alutaceous than in the preceding; underside brilliant golden-green, a little coppery at the sides; flanks of prothorax nearly smooth, not coarsely longitudinally wrinkled, as it is in all the preceding species; prosternum closely curved round the coxæ; legs and basal joints of antennæ shining castaneous; palpi piceous; apex of epistoma, and labrum, dull red.

Long.  $7\frac{1}{4}$  lin.

Fianarantsoa.

*Nesogena geniculata*, n. sp.

Near *varians* (Fairm. l. c. p. 190).—Oblong-elliptic, elytra shining coppery-brown, a little æneous down the

sutural edge and the striæ; clearer on the prothorax, which is also bronzed-green at the margins and down the median line: head (except the front, which is reddish-coppery) shining green; sparsely (except behind the eyes) and finely punctured, the side grooves obscurely connected behind; prothorax relatively narrower than in any of the preceding species, gradually contracted in a curve from base to apex; base feebly bisinuate, the impression across the middle strongly marked; finely and remotely (except at the sides) punctured; scutellum green, or greenish-coppery; elytra rather finely but deeply punctate-striate, the intervals convex, finely punctulate, &c.; sides feebly sinuate, the reflexed margins bronzed-green; underside bright coppery-æneous tinged with purple; flanks of the prothorax faintly longitudinally wrinkled; prosternum conical, but scarcely produced, behind; femora shining reddish-castaneous, the base and apex metallic bluish-green; the tibiæ (especially at the base), tarsi, and basal joints of antennæ tinged with metallic-green.

Long. 7—7½ lin.

Antananarivo.

*Nesogena varicolor* (Fairm. i. l.), n. sp.

Ovate, or ovato-elliptic, convex; elytra green, or blue-green, passing into brassy-green, golden, golden-æneous, or purplish golden-coppery, the sides usually more or less purple deepening at the margins and (more especially) at the apex into violet, or dark greenish-violet; the head, prothorax and scutellum are all equally variable in colour; head moderately punctured; prothorax strongly curvedly contracted anteriorly, subparallel, or slightly expanded, posteriorly; moderately punctured: elytra more or less oblong-oval, rather finely punctate-striate, the intervals but little convex, finely remotely punctured and alutaceous; sides scarcely sinuate, moderately margined; underside brilliant, varying from green to purple and violet; legs and basal joints of antennæ chalybeate-blue, shining; flanks of prothorax faintly longitudinally wrinkled; prosternum curved round the coxæ, not at all prominent behind, sometimes impressed between the coxæ.

The ♂ has the antennæ longer, the intermediate and hind femora villose beneath on their basal half.

Long. 9—10 lin.

Fianarantsoa.

*Nesogena Haugi*, n. sp.

Near *iodolimbata*, Fairm., but more elliptic, of a bronzed-coppery, almost obscure; the margins of the prothorax, the striae and the reflexed margins of the elytra, blue, or obscure violaceous; the sides of the elytra are not at all violaceous, but are of the same colour as the back; the striae are shallower, the intervals less convex, more closely and more intricately alutaceous; the underside, including the epipleural fold, is brilliant brassy-green, or bluish-green; the flanks of the prothorax much more faintly wrinkled; the femora are red, or testaceous-red, with the base and apex, the tibiae, and the basal joints of the antennae, dark cyaneous.

In both species the prosternum is curved round the coxae, and is not at all prominent behind.

Long. 9—10 lin.

Fianarantsoa.

*Nesogena Coquerelii*, *viridicuprea*, *cræsus*, and, possibly, *æncipennis*, form a group distinguished by the squarer, broader-shouldered, more convex, and more parallel-sided, elytra; and still more especially by having the flanks of the prothorax more or less closely and coarsely punctured and rugose. In none of the preceding species is there any trace of punctuation on this part. *N. viridicuprea* is excessively variable in colour, ranging from violet-black to metallic-green and fiery-coppery. My examples are all from Antananarivo.

*N. cræsus* (Fairm. i. l.) is exceedingly near to *viridicuprea*, and is only distinguished from it by the form a little less robust and less broad-shouldered; the prothorax less conical, *i. e.*, more rounded at the sides, and more parallel behind the middle; the punctuation, and the punctured striae, a little finer; the legs, antennae and mouth organs clear shining red; and the colour green more or less suffused with violaceous.

Long. 6—8 lin.

Fianarantsoa.

*Nesogena testaceipes* and *intermedia*, have also the flanks of the prothorax rugose-punctate; but they are distinct from all the other species by the anterior tibiae having the outer apical angle produced into a large acute tooth.

In none of these species have I seen the femora pilose beneath; but I observe, in some examples, the hind tibiae

to be distinctly and closely fringed with hairs on their inner edge, in *viridicuprea* and *cræsus*; whilst in *testaceipes* and *intermedia* there is a tuft of curled hairs at the apex of the hind tibiæ within. In both cases I take the characters mentioned to indicate the ♂.

PSILONESOGENA, nov. gen.

Head (leaving out the muzzle) subglobular, constricted behind forming a short neck; muzzle very long; antennary orbits narrow, prominent, conical; epistoma quadrate, plane, parallel-sided, squarely truncated in front; labrum very large, expanding outwardly, lightly emarginate in front; mentum as in *Nesogena*; mandibles fine, strongly incurved and deeply cleft at the apex;\* maxillary palpi elongate, slender, the last joint very obliquely truncated; eyes large, approximate above (more so in the ♂ than in the ♀), not closer beneath than in *Nesogena*, bordered within by a groove which is prolonged up to the epistomal suture; antennæ very long, slender, joint 1 exposed to the root, swollen; 2—3 obconic; 2 short; 3 as long again as 2; the rest very long, subequal, becoming gradually filiform; prothorax a little transverse, convex, strongly rounded anteriorly, a little constricted posteriorly; apex truncate and very finely margined; front angles obtuse and much depressed; base feebly sinuate and strongly margined, the angles obtuse and depressed; lateral edges fine but sharp and distinct; scutellum rather large, triangular; elytra depressed above, nearly as wide again as the prothorax at the base, elongate, subparallel from the shoulders, which are rounded and prominent above; strongly sinuately narrowed and pointed at apex; legs elongate, slender, unarmed; tarsi simple, slender, elongate, pilose beneath, the 1st joint of all (but more especially the middle and hind) long; mesosternum of the same form as in *Nesogena*, but less open and less concave in front; prosternum rather narrow and convex between the coxæ, and curved round them in the ♂, a little produced and narrowly conical behind in the ♀; epipleural fold expanded at the base, not extending to the apex of the elytra; intercoxal process narrowly rounded

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\* In some species of *Nesogena* (e. g. *intermedia*, Fairm.), the mandibles have a similar form, and show indications of a fissure at the apex.

at the apex. The ♂ has the intermediate and hind femora thickly pilose beneath on their basal half, and has six abdominal segments, the fifth being ciliate along its lower edge, and the sixth membranaceous and deeply emarginate at apex.

A very remarkable genus, presenting the most intimate relations with *Nesogenea* and its allies on the one side, and with the *Lagriidæ*, through *Statyra*, on the other. It has completely the facies of this last genus, but the simple penultimate joint of the tarsi; the prothorax wider than long, its pronotum distinctly separated from its flanks; joints 4 to 11 of the antennæ subequal in length, &c., will serve to distinguish it. The form of the pro- and mesosterna at once separates it from *Strongylium*; whilst its fuller and larger eyes approximate above, its long narrow form, and depressed elytra, will separate it from *Nesogenea*.

The sexual characters are as in the majority of the species of *Nesogenea*, with the addition of a sixth ventral segment in the ♂. I observe in some species of *Statyra* the anterior femora are pilose beneath. The additional abdominal segment in the ♂ is also found in the *Statyrini* (Leconte), and also, according to Lacordaire, in certain American forms in the genus *Strongylium*.

It seems to me that the character insisted upon by Lacordaire as separating the *Lagriidæ* from the *Tenebrionidæ*, viz., the prominency and contiguity of the anterior coxæ, completely fails us at the present time; for I can see no material differences in these respects between *Statyra* and the majority of the species of *Nesogenea*. I think this prominency, where it occurs (in *Trachelostenus*, *Lagria*, *Eutrapela*, *Arthromacra*), is more apparent than real, and its appearance is owing to the prosternum not being elevated between the coxæ, and up to a level with them (as it is in *Statyra*). Leconte, in his "Classification of the Coleoptera of North America," p. 246, relies upon the protuberant anterior coxæ, the dilated penultimate joint of the tarsi, and the different larvæ. The second of these points is shared by too many of the *Tenebrionidæ* to be of any value; and as for the last point see Lacordaire, "Généra des Coléops," p. 564, note 1.

*Psilonosogena hybrida*, n. sp.

Elongate, narrow, depressed on the elytra; head shining black, a little aeneous on the front, between the eyes,



where it is also (in the ♂) longitudinally impressed and finely rugose-punctate; epistoma smooth, impunctate; labrum coarsely rugose-punctate on its apical half; prothorax shining greenish-black, not visibly punctured; scutellum black, obliquely impressed at each side; elytra metallic brassy-green, purple at the apex, the sides also tinged with purple; strongly punctate-striate, the middle and outer striae abbreviated behind; intervals a little convex, impunctate, nearly smooth: underside, legs, and basal joints of antennae, pitchy-black, shining.

Long.  $6\frac{1}{2}$  lin.

Antananarivo.

NOTE.—The *Nesogena purpureo-limbata*, of the Catal. Dej. and Munich, is the same as *N. iodo-limbata*. Fairmaire.



XXII. *On the affinity of the genus Polyetenes, Giglioli, with a description of a new species.* By CHAS. O. WATERHOUSE.

[Read October 1st, 1879.]

(Plates IX. and X.)

THE genus *Polyetenes* was originally described by S. Giglioli in the "Quarterly Journal of Microscopical Science" (Vol. IV. 1864, p. 23), the name having been proposed by Prof. Westwood. It was described as belonging to the Dipterous family *Nycteribiidæ*. In the year 1874, Prof. Westwood, in his "Thesaurus Entomologicus Oxoniensis," redescrines the genus, placing it under the heading of *Anoplura*, but states that a slight examination convinced him that it had no affinity with *Nycteribia*, whilst a more careful investigation showed that it possessed a haustellum very similar in form to that of the genuine *Hemiptera-Heteroptera*. From this I infer that Prof. Westwood considers that the genus has rather affinity with the *Hemiptera* than the *Diptera*. The affinity, however, with the *Hemiptera* appears to me to be quite untenable; in fact, there are only two characters, viz., the form of the rostrum, and the fact that the species appear to undergo the "metamorphosis dimidiata," which seem to link it with this order. On the other hand, the habits of the insects, which are parasitical upon bats, and the peculiar form of the claws, resemble those of the Dipterous family *Hippoboscidæ*. I think, however, that the question is satisfactorily decided by comparison with some allied species.

In the British Museum collection there is an insect which I believe to be from Colombia, which, in its general characters, resembles *Polyetenes*, but which possesses a pair of wings, and is evidently allied to the *Hippoboscidæ*. This insect has the abdomen without divisions into segments, in which it resembles *Hippobosca*; but it is without eyes, and the general form of the head, with the curious fringe or comb of spines to the posterior margin, approach

*Polyctenes*. It should be observed, that although the presence of such distinct divisions between the segments in the abdomen of *Polyctenes* gives it a somewhat different appearance from most of the genera of *Hippoboscidae*, some traces of the divisions are found in *Leptoptena*.

As the Colombian insect does not agree with any known genus, I propose a new genus for its reception.

#### EUCTENODES.

Without eyes. Head below, with a series of long spines arranged like a comb along the posterior margin. Abdomen not divided into segments. Wings well developed.

I think this genus may provisionally be placed in the family *Polyctenidae*, that family being placed after the *Hippoboscidae*, or at least near *Strebla*, with which genus it most nearly agrees in the neuration of the wings.

#### *Euctenodes mirabilis*.

Pitchy-testaceous, the head above rather darker than the rest of the insect; the legs testaceous. The head above is beset with long, stiff bristles, which are more crowded together towards the posterior angles, with finer hairs interspersed; below, in front of the mouth cavity, there are a number of short, sharp black spines, which are slightly bent and directed backwards; in the middle there is a narrow channel, which has posteriorly on each side where it opens into the mouth cavity a small obtuse tubercular projection. The posterior margin has a fringe of long, nearly black, closely-set spines. The mouth cavity is ovate; on each side of it there is a longitudinal straight ridge, and these two ridges are joined together at the base by a third. In the middle of the cavity is a rhomboidal plate, which is possibly the base of the rostrum, but I am unable to trace the rostrum itself; if present, it is hidden in the anterior channel.

Prothorax, with shorter, stiff hairs scattered over the back and sides; it is emarginate in the middle of the base. The mesothorax appears as a scutellum, transverse, rounded posteriorly, with some stiff hairs, four of which on the margin are very long. The wings are pale testaceous, with yellow nervures. The prosternum is flat, with a short ridge on each side anteriorly, and a mesial impressed line which extends the entire length and is

continued nearly to the apex of the metasternum ; on each side there is a deep longitudinal cavity, into which the anterior legs can be withdrawn. The mesosternum can be traced by viewing the insect laterally, but it is not visible below. The metasternum is flat, with some stiff hairs on the posterior margin, and two longer ones at each lateral angle. The abdomen has rather closer and darker hairs below than the rest of the body ; at the base there is a somewhat raised triangular portion, which seems to represent the basal segment.

Length 3 mm.

The specimen from which the foregoing description is taken was mounted on the same card as a specimen of *Strebla vespertilionis* from Colombia.

#### *Polycenes lyræ.*

Most nearly allied to *P. molossus*, G. & W., but much more elongate and narrower, uniform pale pitchy-yellow. The anterior portion of the head smooth and shining, with three or four stiff bristles on the margin near the posterior angles. The antennæ apparently with two small joints at the base, the 3rd joint very long, compressed, concave, or channelled on the inner side, the 4th joint about two-thirds the length of the 3rd and more slender, the 5th joint elongate fusiform. The anterior portion of the head below, with five or six cultriform spines placed obliquely near the posterior angles. The posterior portion of the head above smooth and shining, with a ridge on each side of the disk ; the ridge which margins the sides anteriorly turns away posteriorly from the hind angles, and is set with stiff bristles which increase in length as they approach the hind angles ; the basal margin is closely set with short cultriform spines. This portion of the head is concave below, with the anterior margin set with cultriform spines, the sides with stiff bristles which become longer posteriorly ; at the posterior angle there is a conical process which terminates in a very long stiff bristle. The prothorax above has short stiff hairs scattered over the surface, the basal margin has a row of cultriform spines which are pitchy in colour. The dorsal plates of the mesothorax are studded with minute hair-bearing tubercles. The abdomen is sculptured in the same manner. The prothorax is concave below on each side, so that the anterior legs are entirely hidden in the cavity

when retracted; the prosternum is elongate-ovate, with a mesial impressed line.

Length 3·5 mm.

The specimen from which this description is taken was found by my colleague, Mr. Oldfield Thomas, on a bat (*Megaderma lyra*) received from Secunderabad, in the Madras Presidency.

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Since the above descriptions were written, my colleague, Mr. Oldfield Thomas has found at the back of the head of a bat (*Megaderma spasma*), from Java, two specimens of a new *Polyctenes*. I propose to call it

*Polyctenes spasmæ.*

This species is closely allied to *P. molossus*, Giglioli, from China. The head is widest at the posterior angles, gradually narrowed anteriorly. The antennæ are relatively shorter, not extending to the back of the head. The thorax is rather angular at the sides, a little before the middle; the disk has a slight oblique ridge on each side; the base has no fringe of cultriform spines, but has only fine hairs. The dorsal plates of the mesothorax are rounded at the sides and posteriorly, with the mesial longitudinal line dividing them moderately deeply impressed. The metathorax has also a longitudinal impressed line. The legs resemble those of *P. lyra*, the intermediate and posterior tarsi being three-jointed as in that species; the claws are formed in the same manner. The prosternum is truncate in front, parallel at the sides, obliquely narrowed between the anterior legs. The meso- and meta- sterna are nearly as in *P. lyra*.

XXIII. *On the natural affinities of the Lepidoptera hitherto referred to the genus Acronycta of authors.* By ARTHUR G. BUTLER, F.L.S., F.Z.S., &c.

[Read November 5th, 1879.]

(Plate XI.)

IT is a generally-recognized fact amongst Lepidopterists that whilst the structure of the perfect insects decides to what genera they are referable, the larval characters are of greater importance as deciding in what family they ought to be placed; thus Mr. Bates, in his classification of the Butterflies, founded his families entirely upon characters supplied by the early stages.

A short time since Mr. F. Moore called my attention to the fact that the genus *Diphtera* (Ochs.) contained two series of species allied by structure, coloration, pattern and larval characters to genera already existing in the two widely-differing families *Arctiidae* and *Notodontidae*; the European *D. ludifica* representing the *Notodontid* type and being nearly allied to *Harpyia*, *Dicranura* and other genera of "Puss-moths," and *D. orion* representing the *Arctiid* type near to *Ecpantheria* and *Ardyces*.

Upon mentioning the above rather startling facts to Lord Walsingham he very kindly offered to bring his preserved larvæ of *D. orion* to the Museum for me to see, and as they stand in the same drawer with the greater part of his beautiful series of larvæ of *Acronycta*, I was enabled, with his lordship's permission, whilst verifying the conclusions arrived at by Mr. Moore, to examine into the natural affinities of *Acronycta*.

The family *Bombycoideæ*, so far as I can ascertain, was instituted by Dr. Boisduval and adopted by M. Guénée for the reception of a series of Noctuidiform moths having Bombyciform larvæ; but the genus *Acronycta* as characterized by M. Guénée contains larvæ appertaining

in character to both tribes: on looking over Lord Walsingham's series I was not a little startled to find larvæ agreeing in all respects with those of the families *Arctiidae*, *Liparidae* and *Notodontidae* in addition to two of a Noctuid type; for although the larvæ of *Acronycta psi* and *tridens* had long been familiar to me by breeding, and I had several times met with one or two of the others which I had failed to breed, the fact of their perfectly Bombyciform character had never before been prominently brought to my notice.

Seeing, then, the heterogeneous material constituting the genus *Acronycta*, the first thing which I felt bound to do was to look into the structural characters of the moths themselves. After examining the neuration of all the species in the National Collection I was at first staggered to find that the differences between them in this respect were barely sufficient to separate them generically from one another, and I was almost inclined to think that Dr. Boisduval had been justified in instituting the family *Bombycoideæ* for their reception; seeing, however, that differences of greater importance existed in the palpi, I was led to examine the wing-veining of all the families to which the various larvæ of *Acronycta* naturally allied them; the result was most satisfactory, as it clearly demonstrated that this type of neuration was a common one, repeating itself with slight modifications in all these groups of Moths.

The neuration of *Acronycta* (auct.) is as follows:—

*Primaries*, costal vein terminating at about the third fourth of costa; subcostal five-branched, the first two branches being emitted before the end of the discoidal cell, the second united by means of a short oblique cross-vein to the third which is trifurcate; upper radial emitted from the anterior extremity of the cell and close to the origin of the third subcostal branch; lower radial emitted close to the third median branch so as almost to form a fourth median nervule; upper discocellular consequently very long, concave; lower discocellular very short (or even absent). *Secondaries*, with the costal and subcostal veins united at their origins, the subcostal bifurcate, sometimes emitting its branches at the end of the cell, sometimes (*Acrionicta* (sic) Ochs.) beyond it, from a short footstalk; radial emitted from near the centre of the discocellulars, but in some species more nearly approximated to the median branches than in others; upper discocellular angu-



lated, always longer than the lower, the latter oblique; remaining veins normal.

From this type of neuration the genus *Ecpantheria* (*Arctiidae*)\* differs in the emission of the second subcostal branch of the primaries at some distance beyond the end of the cell, and, as a natural consequence, in the absence of the little cross-vein uniting it to the third branch; in the secondaries, moreover, the radial is emitted close to the third branch of the median vein. As these differences are not so great as those existing between many genera associated under the same family, and as *Diphtera orion* and its allies is intermediate in structure, I see no reason why Hübner's genus *Pharctra* should not be reinstated for the reception of *A. rumicis*, *auricomu* and allies, and placed in the *Arctiidae*.

In the *Liparidæ*, the genus *Leucoma*, though so broad in the wing that nobody would naturally suspect it of affinity to *Acronycta*, differs in its neuration in only two important points, that is to say, in the position of the cross-veinlet uniting the second and third subcostal branches of the primaries and in the slight displacement of the second median branch, which is emitted farther from the end of the cell; the difference in the structure of the antennæ not being of more than generic importance, I would propose the removal of *A. leporina*, the type of *Acronicta* (sic) Ochs., to the *Liparidæ*.

*A. aceris* differs from *A. leporina* not only in the greater size of its secondaries and thicker shorter palpi (the palpi of *A. leporina* being markedly slender and long as compared with the other species), but its larva is extremely like that of *Dasychira*: a comparison of the wing-structure of *A. aceris* with that of *Dasychira* shows only one difference, that is, in the slight displacement of the radial of secondaries, which is emitted much nearer to the origin of the third median branch. I would, therefore, place *A. aceris*, as type of Hübner's genus *Artomyseis*, near to *Dasychira*.

*A. megecephala*, both in its larval character and coloration, much resembles some of the genera allied to *Pygæra*; if we compare it with *Pygæra* and *Symmerista* we find that it differs from the former in the displacement of the lower radial of primaries, and from the latter in the displacement

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\* Possessing the same thickened but simple antennæ as in *Acronycta*.

of the second subcostal branch, the cross-vein being absent: this species, therefore, should be referred to the *Notodontidæ* as type of a genus near *Symmerista*.

*A. psi* and *tridens*, which have *Notodontid* larvæ, are referable to the genus *Triæna*, Hübner, and the nearly-allied form *A. strigosa* to the genus *Hyboma* of the same author: they may be placed next to *Gluphisia*, which differs in neuration in the slightly-irregular form of the second subcostal branch of primaries (which is, however, similarly situated and united in the same way to the third branch); it differs, also, in the second and third median branches of secondaries being placed upon a short foot-stalk.

*A. alni* appears to be referable to the *Noctuities*, the caterpillar much resembling both in colour and in its clavate hairs the larva of *Tinolius*, the latter, however, is a semi-looper, and, therefore, not nearly related to it: this species is the type of Hübner's genus *Jocheæra*.

*A. ligustri* seems to be a *Noctuid*, the larva being smooth, green, with yellow longitudinal lines, and a few scattered long hairs;\* the neuration agrees with *Mamestra*, and I should place it provisionally with that genus.

The *Acronyctæ*, then, will be distributed as follows:—

#### ARCTIIDÆ.

*Pharetra*, Hübner.

*P. rumicis*, *P. auricoma* and allies.

#### LIPARIDÆ.

*Acronicta*, Ochs.

*A. leporina*, *A. simplex*.

*Artomyscis*, Hübner.

*A. aceris*, *A. hastulifera*, &c.

#### NOTODONTIDÆ.

Genus —?

*A. megacephala* and allies.

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\* Hübner's figure makes these hairs more prominent than they really are.

*Triæna*, Hübner.

*T. psi*, *T. tridens* and allies.

*Hyboma*, Hübner.

*H. strigosa*.

Tribe NOCTUITES.

*Jocheæra*, Hübner.

*J. alni*.

*Mamestra*, Ochs.

*M. ligustri*.

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DESCRIPTION OF PLATE XI.

- Fig. 1. *Acronicta leporina*, *Linn.*, neuration.  
" 1a. " " " palpus.  
" 2. *Triæna psi*, *Linn.*, neuration.  
" 2a. " " " palpus.  
" 3. *Epantheria læta* ♀, *Walk.*, neuration.  
" 4. *Leucoma vau-nigrum* ♀, *Fabr.*, neuration.  
" 5. *Dasychira pudibunda* ♀, *Linn.*, neuration.  
" 6. *Pygæra bucephala*, *Linn.*, neuration.  
" 7. *Symmerista amazonica* ♀, *Butl.*, neuration.  
" 8. *Gluphisia crenata* ♀, *Esper*, neuration.  
" 9. *Tinolius eburneigutta*, *Walk.*, larva.



XXIV. *Descriptions of new Coleoptera from East Africa and Madagascar.* By CHAS. O. WATERHOUSE.

[Read November 5th, 1879.]

I HAVE to submit to the Society this evening descriptions of some beautiful *Coleoptera* from East Africa and Madagascar. One is a species of *Sternocera*, the second is a remarkable new genus of Longicorns from Madagascar.

The following are the descriptions:—

BUPRESTIDÆ.

STERNOCERA PULCHRA.

Thorace cupreo, albo-fasciculato; clytris viridi-aneis, vittâ obliquâ purpureâ, sub humero maculâ fulvo-tomentosâ.

Long. 22 lin.

A most beautiful species, perhaps most nearly allied to *S. funebris*, Bohem. Thorax bright coppery, very deeply and closely foveate, each fovea with a short tuft of yellowish-white soft hair; the extreme lateral and basal margins blue. Elytra bright green, strongly and thickly punctured, the punctures irregular in form and not arranged in regular lines, filled with extremely fine pale pubescence; beneath each shoulder there is an elongate orange tomentose spot; on each clytron there are the following purple markings or shades, viz., a spot in the middle of the base, a stripe placed a little behind the orange spot, on the margin directed obliquely upwards, and a rather broad streak commencing on the margin a little behind the middle of the elytra, directed for a short distance obliquely upwards and then suddenly bent downwards, obliquely, towards the suture. These purple marks are only visible in certain lights. The underside of the insect is coloured with purple, golden-green and blue-green, and has some patches of fine pale pubescence.

*Hab.*—Mountains of Usangara. Coll. Brit. Mus.

## CERAMBYCIDÆ.

## CHLIDONINÆ.

## CHLIDONES.

Head distinctly broader than the thorax, nearly round, evenly arched from the neck to the clypeus, cheeks extremely short. Eyes very widely separated, not very finely granulated, semicircularly emarginate above. Antennæ placed in a pit in the emargination of the eye (the margins of this pit not raised above the level of the forehead), extending to the middle of the elytra, slender; the basal joint elongate, subcylindrical; the 2nd joint very small, the 3rd as long as the 1st, but much more slender, a little swollen at the juncture with the 4th, which is of the same form and length; the 5th is a quarter longer; the 6th to 9th joints are a little shorter than the 3rd, not quite so cylindrical; the 10th and 11th joints are a little shorter. Thorax narrower than the head, twice as long as broad, somewhat flattened above, moderately constricted before the middle and before the base. Scutellum parallel at the sides, rounded at the apex. Elytra a little broader than the head, but rather narrowed in the middle, flat above at the base, square-shouldered, declivous at the apex. Prosternum rather narrow, regularly arched; mesosternum between the coxæ broader than long, flat, but sloping a little anteriorly; metasternum about as long as broad, its parapleuræ very narrow, gradually narrowed to the apex, concave. Legs very long, the femora very gradually and slightly thicker in the middle. Tarsi slender, the basal joint of the intermediate pair longer than the three following taken together.\* Abdomen in the female gradually acuminate to the apex, the intercoxal process narrow, acuminate, the basal segment long, the following segments decreasing in length.

This genus is one of the many remarkable forms occurring in Madagascar, for which it is extremely difficult to find a satisfactory position. Its general appearance is something between *Cylindrepomus* (*Lamiidæ*) and *Sclethrus*, but its affinities appear to be with the *Tillomorphinæ*, or *Clytinæ*, and I propose to place it after this latter family.

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\* The posterior pair are wanting.

*Chlidones lineolatus*, n. sp.

Elongatus, angustus, niger, opacus; antennarum articulis apicalibus basi, femorumque apice ferrugineis, thorace lateribus lineâ obliquâ et utrinque ad basin puncto parvo albis, elytris abdomineque lineolis nonnullis abidis.

Long.  $8\frac{1}{2}$  lin.

Head thickly and rather strongly punctured, with a fine impressed longitudinal line in front. Thorax thickly and strongly punctured, with a smooth line in the middle (not reaching the base or apex) and a shorter smooth line on each side; there is a round white spot on each side at the base, and a white line on each side, these two lines are united below by a white line in front of the coxæ. The elytra are rather thickly punctured, dull velvety except at the shoulders and apex; each elytron has a short white line at the scutellum, a spot in the middle, and an oblique white line beyond the middle. There is a white line at the side of the mesosternum, a broader band of white along the anterior border of the metathorax, a short line on the parapleuræ; the abdomen has a short white line on the intercoxal process, an oblique line on each side of the basal segment (these last joined together at the apex of the segment), and a band of white at the apex of the second segment.

*Hab.*—Fianarantsoa (Mr. Shaw).





XXV. *On some hitherto undescribed Butterflies inhabiting Southern Africa.* By ROLAND TRIMEN, F.L.S., &c., Curator of the South African Museum, Cape Town.

[Read December 3rd, 1879.]

OF the eleven species described in this paper three (*Amauris dominicanus*, *Libythea Laisus*, *Myrina ficcdula*) are Southern representatives of tropical West African forms; two (*Debis Indosa* and *Eurema Schæneia*) are near allies of other South African species; and three (*Precis Tugela*, *Neptis Goochii* and *Pieris Hæmus*) present characters linking them to both Southern and Western forms. The most interesting species is *Lachnoptera Ayresii*, which is very distinct from *L. Iole*—hitherto the only known representative of the genus. *Junonia Boöpis* is so evidently a form of the widely-ranging and variable *J. Orithyia* of Southern Asia, that it is not without hesitation that I award it species-rank; but, as it is sufficiently different to be readily distinguished from the Asiatic butterfly, and as the case is analogous to that of *J. Cebrene* and *J. Ænone*, it seems desirable that the African insect should bear a name of its own.

Family NYMPHALIDÆ, Swains.

Sub-family DANAINÆ, Bates.

Genus AMAURIS, Hübn.

*Amauris dominicanus*, sp. nov.

*Danaüs Niavius* (Linn.), var., Trimen, Trans. Linn. Soc. xxvi. pp. 511, 521, pl. 42, f. 6 (♂).

Exp. al. (♂)  $3\frac{1}{2}$ —4 in.; (♀)  $3\frac{1}{2}$ — $3\frac{1}{2}$  in.

Black, with semi-transparent white patches and spots. *Forewing*: inner-marginal white patch, large, roughly semi-circular, not extending to base or anal angle or into discoidal cell; sub-apical oblique white bar broad, its extremities not attaining quite to costal or hind-marginal edges; a very oblique elongate white spot in outer half of

discoidal cell; another (longitudinally) close to costa, immediately before sub-apical bar; 2 small rounded spots close to apex; a sub-marginal row of 3—4 small spots just below sub-apical bar, succeeded by a hind-marginal row of smaller spots. *Hindwing*: one large white patch occupies the greater part of the area, leaving only a narrow basal, a linear costal, and a broad hind-marginal (much widened at anal angle) border, diminishing gradually along inner-margin to base. **UNDERSIDE**.—Similar, but the white markings all larger and with suffused edges—notably the hindwing patch, which covers the whole inner-marginal and anal-angular region, and leaves only a rather narrow brown border at apex and along upper part of hind-margin. *Forewing*: apical region beyond bar brown. *Hindwing*: two small white spots at base.

In the ♂ the nervures are strongly clouded with black, as well as the inter-nervular rays, in the large white patch of both wings; in the ♀ this character is either wholly wanting or very faintly indicated.

Closely allied to *A. Niavius*, Linn., but seems constantly to differ as follows, viz.: (1) *its size is considerably larger*, the West African form expanding only  $3\frac{1}{2}$  to  $3\frac{3}{4}$  inches; (2) *the great extent of the white patches* (especially that of the hindwings, which in *Niavius* does not extend beyond the extremity of the discoidal cell) readily distinguishes it. In the clouding of the nervures and inter-nervular rays the ♂ *Dominicanus* exceeds the ♂ *Niavius*, but the reverse appears to be the case with the ♀s.

*Hab.*—Natal (D'Urban and vicinity).—M. J. M'Ken,  
E. C. Buxton and R. Trimen.

Quilimane, E. Africa.—Col. J. H. Bowker  
(1878).

Zambesi.—Rev. U. Rowley [in Mus. Hope.  
Oxon.]

#### Sub-family SATYRINÆ.

#### Genus DEBIS, Westw.

#### *Debis Indosa*, sp. nov.

*Debis dendrophilus*, Trimen, *var.*, Trans. Ent. Soc. 1868,  
p. 285.

Exp. al. 2 in. 9 lin.—3 in.  $1\frac{1}{2}$  lin.

♂. *Dark-brown; the forewing with white spots, the hindwing with ochre-yellow disk and black ocelli.* *Forewing*:

white spots rounded, of various sizes, forming two irregular transverse rows in outer half of wing; those of the inner row arranged so that 4 constitute a narrow oblique bar commencing on costa just beyond middle, a 5th is below and rather before the 4th and much smaller, and the 6th large and sub-ovate between 2nd and 1st median nervules about as far from base as the costal commencing spot of the row; the outer row sinuated, consisting of 7 spots of which the 1st and 3rd are minute, and the 5th and 6th about equal in size and largest; an ochreous tinge over basal region most pronounced on inner-margin. *Hind-wing*: entire disk ochre-yellow; a brown suffusion over basal and inner-marginal region and narrowly along costa; a moderately broad hind-marginal border of dark-brown, traversed by two parallel lunulated pale-brown streaks of which the outer is well-marked; beyond middle a row of 5 black ocelli with minute bluish-white centres; of these the first (close to costa) and the 2nd (between 2nd sub-costal and radial nervules) are widely separated from each other and from the other 3 (which lie between the 3rd median nervule and anal angle) and the 4th is the smallest and usually bipupillate. **UNDERSIDE.**—*Hindwing* and base and apex of forewing pale-brown, varied with dull cream-colour, and streaked with dark-brown. *Forewing*: 4 bluish-white, irregularly-shaped spots in discoidal cell near its extremity, and a 5th (minute) just beyond cell; the 2nd and 3rd white spots of outer transverse row (close to apex) ringed with yellow, and the 3rd also with an inner black ring so as to constitute a perfect ocellus; the apical pale-brown, extends along great part of hind-margin and is traversed by 2 parallel slightly-sinuated dark-brown sub-marginal streaks. *Hindwing*: basal region crossed by 3 extremely irregular dark-brown striæ, of which the outermost is greatly interrupted but joins the innermost by a longitudinal streak running between sub-median and internal nervures; an independent short striæ marking extremity of discoidal cell; ocelli more elaborate than on upperside, all in yellow rings outwardly brown-edged and containing a more or less incomplete internal blue iris; occasionally a sixth small ocellus situated between the 1st and 2nd, but usually only a very faint circular spot there; the 3 lower ocelli surrounded by dark-brown clouding; the 2 sub-marginal brown striæ conspicuous on the pale ground.

♀. Like the ♂, but duller and paler in colour; *the*

white oblique costal bar of forewing very much broader. On underside of forewing the two inner bluish spots in discoidal cell are enlarged and confluent, forming a short rather wide bar indented outwardly.

Intimately allied to *D. dendrophilus*, Trimen (*Trans. Ent. Soc.* 3rd Ser. i. p. 399, and *Rhop. Afr. Aust.* ii. p. 191, pl. 3. f. 8), but at once known by the very conspicuous white spots of the forewings, particularly those of the inner row, which in *D. dendrophilus* are always small and ochreous and externally ill-defined or suffused, and in some specimens almost indistinguishable from the general ochreous clouding. The continuous costal bar formed by the conjunction of the upper 4 spots of this row is the most striking feature of this character; it is quite constant in the male, and much developed in the only female that I have seen. The larger size and darker ground-colour, as well as the much brighter ochre-yellow of the hindwings, are also very noticeable in *Indosa*; while the underside of the hindwings is paler and more variegated. The ocelli are larger and more conspicuous than in *Dendrophilus*, and are much more constant in number (5) and position; the species just named possessing from 5 to 7, but more commonly 6 or 7 on the upperside, but invariably 7 on the underside.

*Hab.*—Natal (Tunjumbili, 1867; Pinetown, 1879; Illovo, 1879). R. Trimen, Col. J. H. Bowker, F. P. Payn.

Transvaal (Leydenburg District). T. Ayres [in South African Museum].

Sub-family NYMPHALINÆ, Bates.

Genus LACHNOPTERA, E. Doubl.

*Lachnoptera Ayresii*, sp. nov.

Exp. al. (♂) 2 in.  $4\frac{1}{2}$  lin.; (♀) 2 in.  $7\frac{1}{3}$  lin.

♂. Warm fulvous-ochreous (a faint rosy-violaceous surface-gloss) with fuscous markings. Forewing: beyond middle a conspicuous transverse bar from costa to 3rd median nervule, exteriorly irregularly dentated, interiorly suffused and emitting two linear rays (along costa and sub-costal nervure respectively) towards base; about midway between this bar and apex a similar much smaller bar, not extending below 1st radial, exteriorly confused

on costa with some narrow apical fuscous clouding; beyond middle, extending from 5th sub-costal nervule to sub-median nervule, a somewhat irregular row of 6 variously-shaped spots, of which the 1st (touching apical fuscous) and last are larger than the rest, and about equal in size; near hind-margin a well-marked, strongly-lunulated streak, from just before apex to extremity of sub-median nervule; between 2nd radial and 2nd median nervules this streak is interiorly broadly suffused, so as to form a conspicuous irregular marking; a sub-marginal streak, touching the lunulated streak at extremities of nervules; hind-margin itself unequally clouded with fuscous; a very faint linear streak closing discoidal cell, preceded by traces of another. *Hindwing*: sexual badge glossy leaden-grey, occupying costal-apical area, covering both sub-costal nervules but not reaching radial or anywhere extending to edge of wing; about middle, disconnected traces of a thin transverse streak; beyond middle, an irregular row of 4 sub-linear lunulated marks, preceded (between 2nd median nervule and sub-median nervule) by 2 small rounded spots; lunulated and sub-marginal streaks as in forewing, but the former presenting no suffused marking; hind-margin free from any fuscous clouding. **UNDER-SIDE**.—Soft ferruginous-ochreous, clouded with violaceous in parts; the markings chiefly fulvous-ochreous and inconspicuous. *Forewing*: inner marginal area, as far as a little above 1st median nervule, pale yellow-ochreous; all the markings corresponding to those of the upperside almost obliterated, except the last spot in the transverse row, which is fuscous and conspicuous; in discoidal cell 2 irregular fulvous-ochreous rings; beyond them, an interrupted transverse streak of the same colour, meeting (between 1st median nervule and sub-median nervule) a similar interrupted streak from costa a little beyond middle; just above posterior angle a slight hoary-grey clouding. *Hindwing*: a fulvous-ochreous irregular streak before middle, from costal to below sub-median nervule; a short linear streak of the same colour closing discoidal cell; about middle, an indistinct similar transverse streak, bounded exteriorly by a sinuated interrupted series of white spots; these spots immediately succeeded by some dusky-violaceous clouding, which completely surrounds 2 faintly white-centred fulvous-ochreous ocelli (in narrow rings of the ground-colour) between 1st sub-costal and radial nervules, as well as 2 other similar ocelli between

2nd median nervule and sub-median nervure; beyond these, a broken irregular line of lunular marks, succeeded by lunulated and sub-marginal streaks corresponding with those of the upperside—all fulvous-ochreous; a hoary-violaceous clouding about upper hind-marginal area.

♀. *Duller and paler than ♂, and without violaceous gloss; all the fuscous markings more pronounced.* *Forewing*: from lower extremity of first costal bar, an irregular interrupted streak extending to about middle of sub-median nervure; 2nd costal bar prolonged to 3rd median nervule by 2 small elongate spots; all spots of discal row larger than in ♂; two cellular streaks distinct, the inner one extending below cell and a little over 1st median nervule. *Hindwing*: about middle, an irregular interrupted streak (continuous of that in forewing) extending and gradually attenuating as far as sub-median nervure beyond middle; 3 *black spots* (of which the 2 upper are large and the costal one somewhat suffused) *take the place of the leaden-grey badge of the ♂*; these spots are continuous of the discal row of the forewing, and the costal one is anteriorly bounded by a whitish lunule. **UNDERSIDE.**—Very different in colour from that of the ♂, *being very pale dull greyish-ochreous, with a strong brassy-greenish gloss*; nearly all the markings indistinct. *Forewing*: last spot of discal row large and conspicuous. *Hindwing*: the interrupted series of white spots *wanting*; ocelli with small but conspicuous white centres; an additional (5th) ocellus next costa.

In outline this *Lachnoptera* differs from the only species hitherto known, *I. Iole* (Fab.), the forewings being more produced apically and the hindwings more angulated at the extremity of the 3rd median nervule. The male differs from the ♂ *Iole* on the upperside in both colouring (which is brighter and yellower) and marking; the forewings presenting *two costal blackish bars* and a blackish suffused marking on the lunulated sub-marginal streak, and the hindwings having a much smaller sexual badge. On the underside the South African form has the markings far less distinct, and *the white stripe of the hindwings is interrupted and macular*; the latter wings also want the ocellus which in *Iole* is situated between the sub-costal nervules. The female differs greatly in appearance from the butterfly which the late Mr. Hewitson referred (I believe rightly) to that sex of *Iole*, which I noted as “fuscous; all the outer area of

the wings dull-white, with the spots and streaks strongly and blackly marked; markings of the underside agreeing with those of *Iole* ♂.

This interesting new species I have named after its discoverer, Mr. B. Ayres, of Pinetown, in Natal, who took a single male in that locality. Mr. W. D. Gooch, who brought the specimen to my notice, subsequently took another ♂, and also the ♀ above described, at his farm on the coast of Natal, and has lately most liberally presented me with these specimens.

*Hab.*—Natal (Pinetown and Little Umhlanga). B. Ayres, W. D. Gooch.

### Genus EUREMA, E. Doubl.

#### *Eurema Schœncia*, sp. nov.

♂. *Pyrameis Hippomene*, Boisd., Trimen, "Rhop. Afr. Aust.," i. p. 121 (1862.)

Exp. al. (♂) 1 in. 11 lin.—2 in.; (♀) 2 in. 3—5 lin.

*Brownish-black*; both wings with a band of ochre-yellow: the forewing with small white spots in apical portion.

♂. *Forewing*: band from costal edge a little before middle to inner-margin just before anal angle, narrowest on costa and widening downward, slightly arched outward; about midway between band and apex, 3 small spots form a thin transverse costal streak, the spot on costal edge being ochre-yellow, and the other two spots white; parallel to hind-margin a row of 5—6 small white spots between costa and 2nd median nervule, the spot next costa geminate; costa from base to ochre-yellow band dull-ferruginous. *Hindwing*: band hind-marginal, much narrower than that of forewing, extending only from apex to 3rd median nervule, traversed longitudinally by an indistinct lunulated ferruginous-brown streak; a little before band two suffused transverse black streaks, convergent, but not extending below 3rd median nervule; anal angle acuminate, and anal-angular portion produced; a long, ferruginous, whitish-tipped tail at extremity of 3rd median nervule; another (not whitish-tipped and only half as long) on 1st, and an acute dentation on 2nd median nervule; between 3rd and 2nd nervules a very

imperfect blue-dotted black ocellus edged outwardly by an ochre-yellow lunule, and immediately below it a similar but almost complete ocellus; close to hind-margin some indistinct black lunulate marks, that at anal angle preceded by a pale-bluish streak. Cilia white between nervures. **UNDERSIDE.**—*Hindwing and apical portion of forewing variegated with ochreous and ferruginous-brown and with lilac-blue irrorations.* *Forewing:* band much paler than on upperside, and white on costa; apical white markings as on upperside, but fuscous-edged, the streak from costa wider and immediately preceded by some lilac-blue irroration; in discoidal cell, a black ferruginous-central spot in a bluish-white ring, and a similarly-coloured transverse bar (touching inner edge of yellowish band) whose white edges are irregularly prolonged below cell to sub-median nervure; hind-margin edged with ochreous- and ferruginous- brown; a lilac-blue submarginal streak, indistinct towards apex, near which it is preceded by 3—4 lunules of the same colour. *Hindwing:* a pale-ochreous spot at base enclosing a blackish-centred dull-whitish ocellus in a ferruginous-brown ring; the following dark ferruginous-brown markings, viz., 1 roughly triangular on costa next to basal spot; another elongated and elbowed on costa a little beyond the first; and 2 in discoidal cell, one basal and circular, the other central and elongated, both ringed with a bluish-white line; marking extremity of cell a similarly-coloured much longer marking, blunt superiorly and pointed inferiorly, crossed by paler nervules; near inner-margin on disc much lilac-blue irroration, and a little near costa towards base; beyond middle a very irregular pale-brown streak, bordered on both sides by dark ferruginous-brown, and becoming very zigzag and broken near inner margin; apical hind-marginal region pale-ochreous shaded with brown and glossed with violaceous; sub-marginal lunules linear, black, edged outwardly with yellow, inwardly with lilac; the ocellate spots imperfect, but beyond and above them much greenish-blue irroration, and immediately before them a strongly-festooned black streak, which becomes ferruginous-brown and finally obsolete in its extension towards apex.

♀. Duller and paler than ♂; apical region of forewing less produced and blunter, the tails of hindwing broader and with blunt tips.



Very closely allied to *E. Hippomene* (Hübner),\* and to the butterfly described and figured under the same name by Boisduval, in his "Faune Entomologique de Madagascar, &c.," p. 43, pl. 8, figs. 3, 4. In outline and marking, *E. Schæneia* would appear (judging from Boisduval's work only, for I have no examples of the Mascarene species) to be more intimately related to Boisduval's insect than to its South African congener, the true *Hippomene* of Hübner. From the latter, *Schæneia* is best distinguished by (1st) *the very much longer (and ferruginous instead of black) tails of the hindwings*; (2nd) the narrower (especially in hindwings) and more deeply-coloured yellow bands; (3rd) *the two suffused transverse black streaks on disc of hindwings*, which are wanting in *Hippomene*; and, as regards the underside, by (4th) the costa of forewing near base being faintly dusted with bluish scales instead of conspicuously barred with whitish; (5th) *the decidedly ferruginous and lilac-glossed general colouring*; and (6th) the absence in hindwings of both the costal white patches and the two or more ocelli in superior half of discal region.

*Hab.*—Cape Colony: Bathurst (Plant, 1870); King William's Town (Col. J. H. Bowker, 1872 and 1876, and J. P. Mansel Weale, 1877).

Kafirland: Bashee River (Col. J. H. Bowker).

Natal: D'Urban (J. Sanderson, 1867, C. Morland, 1859, and W. D. Gooch, 1874).

Transvaal: Potchefotroom (Skill, 1876), Leydenburg District (T. Ayres, 1879).

### Genus JUNONIA, Hübner.

#### *Junonia Boöpis*, sp. nov.

*Junonia Orithyia* (Linn.), Wallengr. K. Sv. Vet.—Akad. Handl. 1857, p. 27, n. 1. Trimen, Rhop. Afr. Aust. ii. p. 327 (1866).

Exp. al. (♂) 1 in. 9½ lin.—2 in. 1 lin.; (♀) 2 in. 1—3½ lin.

♂. *Black; hindwing mostly shining violaceous-blue; forewing with sub-apical creamy-whitish oblique bar.*

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\* *Hypanartia Hippomene*, Hübner, Samml. Ex. Schmett. ii. pl. 25 (1806).

*Forewing*: costa edged with creamy-white, which is widest and suffused about middle; in discoidal cell two transverse fulvous striæ, of which the outer (marking extremity of cell) is the better marked; between them a blue stria; immediately beyond cell occasionally traces of another blue stria; sub-apical whitish bar narrow near costa, strongly indented by ground-colour just below 2nd radial, divided into 4 by crossing nervures—its two lower and much broader divisions vertically intersected by a more or less suffused black streak; near apex a short creamy-whitish narrow costal bar; between this and the lower part of the sub-apical oblique bar, a small blue-centred black ocellus in a fulvous ring; a similar, usually rather larger, ocellus (commonly suffused with fuscous) adjoins lower extremity of the oblique bar; between the latter ocellus and inner-margin, close to posterior angle, a sub-quadrate violaceous-blue patch; just before hind-margin two parallel creamy-whitish streaks (of which the outer is very thin and sometimes nearly obsolete), broken into spots by the clouded-blackish nervures, and shot with blue at and a little above posterior angle. *Hindwing*: blue occupies entire discal portion, infringing a little the outer part of discoidal cell, whose extremity is usually marked by a strong black streak; inner-marginal border fuscous; 2 ocelli like those of forewing on disc, one between 2nd sub-costal and radial nervules, the other between 1st and 2nd median nervules; of these, the upper ocellus is often minute and without the fulvous ring; the two hind-marginal whitish striæ less broken than in forewing and preceded by a fuscous one, but much suffused by the discal blue. **UNDERSIDE**.—*Dull cream-colour*. *Forewing*: basal portion ochre-yellow, which does not reach, however, either costa or inner-margin; blue cellular striæ, represented by whitish ones, black-edged on both sides; oblique bar rather paler than ground-colour, strongly black-bordered anteriorly; ocelli ill-defined, their wings much paler, the lower one larger than on upperside; a fuscous space below the latter. *Hindwing*: two thin, inconspicuous, crenulated, fuscous, transverse streaks from costa to inner-margin, one before, the other a little beyond middle; of these, the outer is externally bordered by an ill-defined argillaceous fascia; in discoidal cell two slightly-paler transverse striæ, thinly fuscous-edged; ocelli usually very faintly indicated with fuscous, but between them traces of two other faint ones, and above the 2nd sub-costal the indication of a 5th; a

fuscous mark at anal angle. In both wings, two parallel sub-marginal fuscous lines, the outer continuous and lunulated, the inner broken into small cuneiform marks.

♀. *Fuscous*; all the ocelli much larger, but especially those of hindwings; blue of hindwings much smaller in extent, and both duller and paler. *Forewing*: a minute ocellus usually confluent with the lower edge of upper ocellus, and an imperfect one touching its upper edge. *Hindwing*: the much-enlarged ocelli have great violaceous centres (often with a white dot in the middle), inwardly bordered with pink and outwardly with black; the upper ocellus commonly includes a minute inferior pupil; above and below the lower ocellus occasionally some black irroration; blue space not violaceous, not infringing on discoidal cell, and much narrower in its superior portion; black pretty evenly occupying almost the basal half of the wing. **UNDERSIDE**.—As in ♂, but with the markings (especially ocelli of hindwing) more distinct.

Cilia whitish, varied in forewing with fuscous at the extremities of the nervures.

A very close ally of the South Asiatic *J. Orithyia* (Linn.), but appearing to differ from it constantly in the particulars now to be mentioned. As regards the ♂, *J. Boöpis* has (1st) the narrower sub-apical bar of the forewings and the adjacent pale markings much yellower in tint; and (2nd) the black streak intersecting the lower part of the bar between the 2 ocelli is never wanting and usually very strongly marked; while (3rd) the fulvous striæ and rings of the ocelli are well pronounced; (4th) the blue of the hindwings, besides being decidedly violaceous in tint, occupies a considerably smaller space, being replaced by black in the basi-costal region to a little beyond the branching of the sub-costal nervure; and (5th) the underside colouring is duller and more inclining to argillaceous. The ♀ *Boöpis* presents similar differences from the ♀ *Orithyia*, except that the blue of the hindwings, though deeper in tint, is not violaceous, and, though occupying a smaller space (the basal black being considerably broader), the difference in area is not so marked as in the ♂s.

Compared with *Orithyia* from Ceylon and Southern India (Bangalore), the ♂ of which expands only 1 in.  $8\frac{1}{3}$ —11 lin., and the ♀ 1 in.  $9\frac{1}{2}$  lin.—2 in. 1 lin. *Boöpis* is considerably the larger; but further Eastward, especially in China, the Asiatic species is fully as large

as, and even larger than, the African. The wings of the ♂ *Boöpis* are proportionally longer; but I have not seen any specimen in which the forewings are sub-falcate, as is the case with some of the Chinese examples of *Orithya*. Hopffer's *J. Orithya* from Querimba (Peters' "Reise nach Mossambique," *Ins. und Myriop.*, p. 380) is probably referable to *J. Boöpis*.

*Hab.*—Transvaal: Potchefotroom (W. Morant, 1872, and T. Ayres, 1872 and 1879), and Pretoria (W. Morant, 1872).

Zambesi (♂ in South African Museum).

Damara-land (J. A. Bell, 1862).

### Genus PRECIS, Hübn.

#### *Precis Tugela*, sp. nov.

Exp. al. 2 in. 5½ lin. (♂); 2 in. 11 lin. (♀).

♂. *Dark brown, with broad ochre-yellow discal band.* *Forewing:* band commencing on costa, curved convexly outwardly, its edges irregular (especially the inner one, which is *deeply indented by ground-colour* just below 3rd median nervule); from near apex to above sub-median a discal row of 6 small black spots, the lower three of which are in the yellow band just beyond its middle line; the 1st and 2nd of the row are white-centred (the latter conspicuously), and the 6th accompanied inferiorly by a black dot; costa near base sealed with ferruginous-rufous; in discoidal cell 3 black-edged irregular striae, of which the basal one is rufous-tinged and imperfect—the central one distinctly rufous in its upper portion—and the outer one of the ground-colour defining extremity of cell; along hind-margin, 2 very indistinct paler lunulated striae, the inner rather more apparent than the outer, being slightly dusted with whitish. *Hindwing:* band commencing narrowly on costa, but suddenly broadening between sub-costal nervules, and continuing widely almost to inner-margin beyond middle; it is rather paler than in forewing, but similarly contains exteriorly a row of small black spots, all 6 of which are conspicuous on the ochre-yellow; hind-marginal lunulated striae rather more distinct than in forewing, especially near anal angle where they are sprinkled with bluish-white scales continuous of those which cover the long anal-angular projection; hind-margin distinctly edged with rufous-ochreous. Cilia very narrow, dull-brown generally, but white just below projection of fore-

wing. **UNDERSIDE.**—Varied with ferruginous-brown and pale ochre-yellow; *a conspicuous patch of the latter in forewing on costal border beyond middle*; the sub-marginal lunulated stria lilac-white, suffused; the small black spots of discal row all white-centred except the 4th and 5th of the forewing; a dark-brown streak curving inwardly, commences suffusedly on sub-apical projection of forewing and runs to anal-angular projection of hindwing.

♀. Closely resembles ♂. *Forewing*: costa narrowly suffused with ochreous throughout, the ferruginous-rufous towards base and in disco-cellular striae more distinct than in ♂; 3rd spot of discal row (as well as 1st and 2nd) white-centred. *Hindwing*: 3rd spot of discal row minutely white-centred. **UNDERSIDE.**—That of one example marked as in ♂, and with the pale-ochreous patch of forewing very conspicuous, *but with bronzy greenish-grey replacing the ferruginous-brown*, and the common dark stripe very strongly marked; while that of a second example is *wholly pale-ferruginous* with violaceous and bronzy reflections, with the common streak and the discal spots faintly marked in *dull cream-colour*. In outline of forewing the sub-apical projection is very long, and dusted with bluish-white, while in the ♂ it is quite short and without irroration.

In colouring and marking this species bears a very strong resemblance to *P. Elgiva* (Hewits.), but is at once distinguishable (1) by the hindwings presenting a row of simple black spots of small size on the upperside instead of the multicoloured ocelli; and (2) by the deep indentation of the ochre-yellow band of the forewing on its inner side. In outline, *P. Tugela* has the projections of the wings in both sexes (1st particularly in the ♀ as regards the forewings) very much longer. The species to which *Tugela* seems actually most nearly allied (setting aside the colour of the transverse band) are *P. Pelurga* (Fab.) and *P. Kowara* (Ward) from West Africa; both of which present almost the same outline of wings, description of spots in discal row, and inner indentation of the band on the forewings.

I know of only three examples of this butterfly, viz., a ♂ taken by myself in Natal (at Krantzkop, Tunjumbili, in 1867), and two ♀s from the Transvaal (Leydenburg District), in a fine collection formed by Mr. T. Ayres, and lately acquired by the South African Museum. It is probable that the species is not so rare as it might appear

to be, for undoubtedly it would readily be passed over as *P. Elgiva* by many collectors. The great variation in the underside colouring is a feature highly characteristic of the genus and of several allied groups.

*Hab.*—Natal (Tunjumbili); Transvaal (Leydenburg).  
—R. Trimen; T. Ayres.

*Neptis Goochii*, sp. nov.

Exp. 1 in.  $4\frac{1}{2}$  lin.—1 in. 9 lin.

*Fuscous, with pure-white bands and spots. Forewing:* a longitudinal white bar, divided transversely about its middle, occupying lower half of discoidal cell; a small spot immediately beyond extremity of cell; sub-apical costal bar broad, even, abruptly truncate on radial nervule; close to outer extremity of this bar a small spot, in a longitudinal line with that just beyond extremity of cell; large spot on disc between 3rd and 1st median nervules about the same size as costal bar, but less elongate and more rounded; inner marginal marking rather small, acuminate superiorly; five almost parallel, thin, sub-marginal white streaks, of which the innermost is indistinct and more widely separated from the rest, more irregular, and the outermost also indistinct. *Hindwing:* central band broad, even, extending to inner-marginal edge, but not to costa, being abruptly rounded off just below the 1st sub-costal nervule; five sub-marginal streaks much as in forewing, but more distinct, the innermost less irregular and more remote from the 2nd. **UNDERSIDE.**—Ground-colour much paler, almost grey; markings corresponding with those of upperside, but sub-marginal streaks broader and more conspicuous. *Forewing:* cellular longitudinal bar not or but very indistinctly transversely divided. *Hindwing:* basal portion with 3 curved transverse white stripes (much as in *N. Agatha*, Cramer, but not nearly so conspicuous), of which the first is on costal edge, and the third near central band and less distinct than the others.

This butterfly is allied to *N. Melicerta*, Drury (*nec* Cramer), and to *N. Saclava*, Boisd., but is considerably smaller than those species. It agrees with the former insect in possessing the longitudinal white bar in the discoidal cell of the forewings (which character at once separates it from *Saclava*, but differs markedly (1st) in *the short, compact, undivided costal bar of the forewings*;

(2nd) in the broad, even, superiorly-rounded band of hindwings; and (3rd) in having four (instead of three) parallel hind-marginal white lines. Other characters separating it from *Saclava* are the small size and acuminate form of the inner-marginal white marking of the forewings, and the entirely-different colouring and pattern of the underside.

Mr. W. D. Gooch, after whom I have named this species, met with four specimens in the neighbourhood of his plantation (Spring Vale) on the coast of Natal. No other examples have come under my notice; but it is not unlikely that the butterfly may escape observation from its resemblance to the not uncommon *N. Saclava*.

*Hab.*—Natal; Little Umhlanga (W. D. Gooch, 1874, &c.).

## Family ERYCINIDÆ, Swains.

### Sub-family LIBYTHEINÆ, Bates.

#### Genus LIBYTHEA, Fab.

##### *Libythea Laius*, n. sp.

Exp. 1 in.  $10\frac{1}{2}$  lin.—2 in. 2 lin.

♂. *Dark brown, glossed with bronzy-yellow reflections; with pale fulvous-ochreous bars and spots. Forewing:* a longitudinal bar from base occupies lower half of discoidal cell, widening gradually to its abrupt extremity just above origin of 1st median nervule; immediately beyond bar (sometimes touching or even merged in it) a large, roughly-sub-quadrangle spot, which is widest interiorly, and anteriorly reaches to end of discoidal cell; a little beyond and below this spot, a larger paler sub-ovate spot, the upper part of which is traversed by the 2nd median nervule; on outer portion of inner-margin a very faint pale-ochreous cloud; an irregular, oblique, sub-apical row of 3 white spots—of which the 1st is nearest middle, largest, exteriorly elongated and crossed in its upper part by the sub-costal nervure—and the others are together apart, of about equal size, one above and the other below the 2nd radial nervule. *Hindwing:* costal margin rather broadly dull-whitish from base as far as a quadrangle, pale, whitish-ochreous spot about middle, lying between costal nervure and 1st sub-costal nervule; below and beyond this spot, just above 2nd sub-costal nervule, a small ochreous spot; beyond middle, a

straight transverse bar formed of 4 contiguous spots (of which the 1st is largest and the 4th smallest and less distinct than the rest), extending from just below 2nd subcostal nervule, not far from apex to 1st median nervule, not far from its origin. **UNDERSIDE.**—Hindwing and apex of forewing very variable in tint and clouding; the prevalent ground-colour being *glossy-grey, irrorated and hatched with black and fuscous*. *Forewing*: paler than on upperside, the bars and spots larger; discoidal cell filled by much enlarged and united bar and spot; a small whitish spot immediately beyond upper part of extremity of cell; 2nd and 3rd spots of sub-apical row united in one crescent-shaped marking. *Hindwing*: in two specimens the upperside costal spot and discal bar represented by 2 irregular whitish transverse rays, interiorly broadly bordered and in parts intruded on by dark-brown clouding—a similar patch of the clouding being present on hind-margin about extremity of radial nervule; in a third example, only the whitish ray near base is indistinctly represented, while the whole discal region and lower half of discoidal cell (up to base and a straight line through the cell) is dull fuscous-brown; and in the fourth example the whole surface is almost uniformly grey, the rays being faintly shown by a glossier paler clouding, and the intermediate parts by some ochreous tinting—at extremity of cell an ill-defined blackish spot.

♀. Similar to ♂, except that the markings generally are larger, especially the bar across hindwing. **UNDERSIDE.**—More uniform than in ♂, and nearly resembling that of the 4th ♂ example above described, but *with a decided glaucous-green tint* both in hindwing and in apical region of forewing; any trace of paler bars in hindwing being obsolete, or nearly so.

In the ♂ the forewings are more prolonged apically than in the ♀; but the hindwings are alike in both sexes, the costal prominence beyond middle being very slight, while the projection at the extremity of the 1st median nervule is very well developed, forming a broad tail or process  $\frac{1}{10}$  inch in length. The palpi of the ♀ are longer and more attenuated than those of the ♂.

This *Libythea* is very nearly allied to *L. Labdaca*, Westw., a native of Sierra Leone, which is only known to me by the description and figure in the "Genera of Diurnal Lepidoptera" (vol. ii. p. 413, note, pl. lxxviii. f. 6). The South African form may, however, be readily



distinguished by the more produced and angulated forewings and by the greater prominence of the projection in the hindwings. The markings of the upperside are all larger, paler, and more fulvous than in *Labdaca*; in the forewings the conspicuous disco-cellular bar is a feature wanting in the West African species, which, moreover, possesses a dull-fulvous irregular marking (between large discal spot and sub-median nervure) absent in *Laius*; and in the hindwings, the transverse bar is nearly straight instead of arched or concave interiorly, as in *Labdaca*, and the separate spot between the sub-costal nervures is peculiar to *Laius*. As regards the underside, the brief diagnosis of *Labdaca* (*l. c.*) applies fairly to that of the more strongly-marked ♂s of the South African insect; but there is so much variation shown in the colouring of the under-surface of the wings in the ♂ that this point is not one of the first importance.

The genus *Libythea*, so widely distributed over the earth, yet containing so very few species, was not apparently known to possess any African representative until Westwood (*l. c.*) in 1851 described and figured the species from Sierra Leone already mentioned. In 1866, I described (*Trans. Ent. Soc. Lond., Ser. III. Vol. V., p. 337*) as *L. Cinyras* a scarce *Libythea*, inhabiting Mauritius and Madagascar, and noted at the same time that Mr. Waller, of the Zambesi Mission, had shown me a *Libythea* taken near the Shiré River, which I judged from recollection might be the same species. Since the discovery of the South African *Libythea*, however, and especially looking to the fact of its occurrence at Quilimane, not far north of the Zambesi Delta, I have little doubt that Mr. Waller's specimen was probably referable to *Laius*, and not to *Cinyras*.\*

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\* The African *Libythea* appear to be distinguished by the prominence and situation of the projecting point on the hindwings from most others of the genus, both *Labdaca* and *Laius* possessing it at the extremity of the 1st median nervule; while in the European and American species the chief projection of outline is not great and is at the anal angle itself (end of sub-median nervure). The only specimens of the Madagascar and Mauritius *L. Cinyras* that I have seen are both too much broken to tell the real form of the hindwings in this respect; but the species is evidently so nearly allied to the species of the Continent of Africa, that probably it has the same outline of wings. The Indian *Myrrha* and *Lepita* have rounded hindwings; but Wallace (*Trans. Ent. Soc. Lond. 1869, p. 335*) notes that the Ceram *L. Narina* resembles the African *Labdaca*; and *L. antipoda*, Boisd., from Macassar, Luzon and New Caledonia, is figured by Felder with a decided projection in the same situation as that presented by the African species.

In December, 1869, Mr. Walter Morant sent me the first evidence of the occurrence of a *Libythea* in Natal, in the shape of a coloured drawing of a ♀ taken by him on the 9th of that month at Avoca, Victoria County; but I heard nothing more of the species until 1873, when the late Mr. E. C. Buxton met with it near D'Urban, and sent me a photograph and a much-injured ♀ specimen. Mr. J. H. Bowker, F.Z.S., in September, 1878, landed at Quilimane, and there took six examples of the same species, which he forwarded to the South African Museum; and he and Mr. P. F. Payn, of D'Urban, have subsequently taken several specimens of both sexes at Pine-town, Illovo, and other localities in the coast region of Natal. From these latter specimens, mostly in fine condition, my description is drawn up.

Mr. Morant noted his example as taken "on the top of a small tree in a waggon-road through thick bush;" while Mr. Bowker describes the individuals captured by himself in April, 1879, as taking short flights, like those of a "Skipper," from one flower to another.

*Hab.*—D'Urban, Umgeni Railway Station, Pinetown, Avoca, and Illovo, Natal. Colls. S. African Museum, E. C. Buxton, P. F. Payn, and R. Trimen.

Quilimane, East Africa. Coll. S. African Museum.

## Family LYCÆNIDÆ, Steph.

### Genus MYRINA, Fab.

#### *Myrina ficedula*,\* sp. nov.

*Loxura Alcides*, Boisd., Sp. Gen. Lep., — Planches, No. 22, f. 3 (1836). Trimen (pars), Rhop. Afr. Aust. ii. p. 219, n. 125 (1866).

Exp. al. (♂) 1 in.  $2\frac{1}{2}$ —7 lin.; (♀) 1 in. 6— $7\frac{1}{2}$  lin.

*Black, with very large discal space of intense metallic ultramarine-blue in both wings; forewing with an apical hind-marginal ferruginous patch. Forewing:* blue occupies inner-margin and discoidal cell, but is rather widely

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\* The larva of this insect feeds on *Ficus natalensis*, and also on the cultivated fig (F. ), and the butterfly is itself fond of sucking the ripe figs.

bordered with black costally (most widely beyond extremity of discoidal cell), and outwardly from 3rd median nervule to anal angle; ferruginous patch occupying hind-margin from apex to sub-median nervule, irregularly convex inwardly, very broad on discoidal nervules, narrowing abruptly at apex, but more gradually to its lower extremity. *Hindwing*: blue fills entire disc and discoidal cell, and is bordered to a moderate width with black along costa and hind-margin (the apical portion being broadest, and the hind-marginal narrowest); inner-marginal border broadly fuscous up to 3rd median nervule, but blue-scaled along sub-median nervule; anal-angular lobe and tail ferruginous, densely grey-scaled; edging base of lobe superiorly, and sometimes extending for a little distance along hind-margin, a fine streak of blue scales; on lobe a spot of unirrorated ferruginous. **UNDERSIDE.**—*Ferruginous-brown*, in most parts very finely and densely irrorated with yellowish and grey scales; in both wings (better defined in hindwing) an ochreous-yellow line closing discoidal cell, and a transverse streak of the same colour beyond middle. *Forewing*: the streak only extends from near costal edge to between 3rd and 2nd median nervules; costa thinly edged with yellow; a conspicuous cloud of yellow scales occupies costa between streak and apex; inner-margin pale-grey, gradually fading into ground-colour superiorly; hind-marginal border darker ferruginous, not (or very thinly) irrorated. *Hindwing*: darker ferruginous before transverse streak; the streak itself well-defined, continuous from costa to below 1st median nervule, where it is slightly broken and abruptly angulated, and is thence *white* to inner-margin and along its edge to base; between this portion of the streak and anal angle, dense greyish-white irroration; a thin greyish line along hind-margin, indistinct superiorly; spot on lobe conspicuous, tinged with crimson.

♀. *Blue much less brilliant; its area much smaller*, so that its black-bordering is broader, especially in *hindwing*, where, in apical region, this is wider than inner-marginal fuscous. *Hindwing*: hind-marginal streak of blue scales more marked, extending to 3rd median nervule or a little further. **UNDERSIDE.**—Quite as in ♂.

This very beautiful *Lycænid* is recognized at once from its congener, the West African *M. Silenus*, Fab. (*Alcides*, Cram.), by (1st) *the greatly-enlarged field of blue*, and (2nd) *the ferruginous bar along hind-margin of fore-*

wings from apex. Judging from Cramer's figure (*Pap. Exot.* i. t. 96, D, E), *M. Silenus* has only a slightly paler fascia near the hind-margin of the forewings, with no trace of ferruginous; and the underside is generally much darker than in *M. ficedula*, and without yellowish clouding. Boisduval's figure purports to represent *Loxura Alcides* from "Guinée;" it is evidently that of rather a small ♂. In pattern and colouring (only the upperside being depicted) it agrees fairly with the Southern form, except that along hind-margin the ferruginous border has a narrow black edging, and that the outline of the hind-margin of the forewing is not elbowed. If the locality of Boisduval's example be correctly recorded, it would appear that *M. ficedula*, or a very near ally, inhabits Western Africa in company with *M. Silenus*.

*Hab.*—Cape Colony:—Knysna (R. Trimen, 1859); Grahamstown (Mrs. F. W. Barber, 1867, and R. Trimen, 1870); King William's Town (W. S. M. D'Urban, 186 ); Fort Warden, Kei River (J. H. Bowker, 1873).

Kafirland:—Bashee River (J. H. Bowker, 186 ); Natal:—Udland's Mission Station and Great Novdsberg (R. Trimen, 1867); D'Urban (coll. J. H. Bowker, 1878).

Transvaal:—Leydenburg District (T. Ayres, 1879).

## Family PAPILIONIDÆ, Leach.

### Sub-family PIERINÆ, Swains.

#### Genus PIERIS, Schr.

##### *Pieris Hæmus*, sp. nov.

*Pieris Poppea*, Trimen [part], Rhop. Afr. Aust. ii. p. 321, n. 215 (1866).

Exp. al. (♂) 2 in. 1—7 lin.; (♀) 2 in. 2½—6½ lin.

♂. *White, with black hind-marginal spots on nervures.*

*Forewing*: base slightly irrorated with fuscous; a broad basal suffusion of orange-red spreading over rather more than half of discoidal cell; costa edged with fuscous, which is widest (and white-scaled) near base, but very narrow about middle of wing; apex rather widely bordered with fuscous; 4 hind-marginal spots, of which the 1st

sometimes joins apical black, and the 4th (at end of 1st median nervule) is always minute. *Hindwing*: base slightly fuscous; a faint orange suffusion, fading outwardly into yellow in basal region; 6 hind-marginal spots of small size, of which the 1st (at end of 2nd sub-costal nervule) is minute, and the 2nd and 6th smaller than the 3 others. **UNDERSIDE.**—*Forewing*: no basal fuscous, and only some faint fuscous scales along edge of costa; orange-red suffusion brighter and spreading nearer to extremity of discoidal cell; in place of apical fuscous 3 small marginal nervular spots, of which the first is a little *before* apex at end of 2nd subcostal nervule. *Hindwing*: *white*, very faintly tinged with yellowish near base and inner margin; costa at and for a little distance from base bordered with orange-red; hind-marginal spots (especially the 1st) larger and rounder than on upperside.

♀. *More or less universally suffused with pale creamy-ochreous*, into which the basal orange-red (which is much duller than in ♂) gradually fades; on the discs the nervures are all more or less clouded with whitish; hind-marginal spots much larger than in ♂. *Forewing*: apical fuscous crossed by 2 or 3 ochreous internervular rays; a minute spot at extremity of sub-median nervure. **UNDERSIDE.**—In the paler specimens almost as white as in ♂, but in the darker ones more or less tinted with creamy-yellow generally. *Forewing*: orange-red suffusion fills discoidal cell, and faintly extends inner marginally almost to posterior angle; hind-marginal spots *not* enlarged as on upperside, but blacker and rounded.

This beautiful *Pieris* is a very near relation of the West African *P. Rhodope*, Fab. (= *Poppea*, Cram.), and of the Malagasy *P. Phileris*, Boisd.; it is, perhaps, not quite so closely allied to *P. Agathina*, Cram. As far as the ♂s are concerned, the *very conspicuous orange-red basal suffusion* of the forewings *on the upperside* readily distinguishes *P. Hæmus* from all the three species named; *Rhodope* and *Phileris* having only a very faint and much smaller orange-yellow tinge, while in *Agathina* there is none at all. The fainter basal suffusion in the hindwings is also wanting in all the three allied forms. On the *underside*, *Hæmus* has none of the rich ochre-yellow of *Agathina*, but its white is less pure than that of *Rhodope* and *Phileris*; the hind-marginal spots, however, are smaller than in the two latter, and agree very closely with those of *Agathina*; and the basi-costal orange-red

of the hindwings is bounded (as in *Agathina*) by the costal nervure, instead of extending suffusedly beyond it as in *Rhodope*; while the wide suffusion from the base of the forewings is but little wider and if anything less bright than in *Agathina*, though very much brighter and broader than in the other two species.

With respect to the ♀s, that sex of *P. Phileris* is not known to me;\* but, as regards the remaining species, *Hæmus* is more like *Agathina* than *Rhodope* in either of its forms. It is best distinguished from *Agathina* by (1) the broader red suffusion from base; (2) the white clouding of the nervures on disc; (3) the broader apical fuscous and larger hind-marginal spots in the forewings; and on the underside by (5) the much paler and less yellow hindwings and apex of forewings, especially white on the hind-marginal edge. Both forms of *Rhodope*, but particularly that in which the forewings are white (*Poppea*, Cram.), are specially characterized by the enlarged hind-marginal spots of the *upperside*, which in the forewings form broad, elongated nervular rays; but on the underside the corresponding spots are quite as in *Hæmus* excepting that they are slightly larger.

In both sexes of *Hæmus* the wings are thinner and weaker in structure than in *Agathina*, but not so delicate and semitransparent as in *Rhodope* and *Phileris*.

*Hab.*—Cape Colony: King William's Town (W. S. M. D'Urban, 1861, and R. Trimen, 1878); Kci River (J. H. Bowker, 1875).  
 . Trans-Kci; Bashee River (J. H. Bowker, 1863).  
 Zambesi (In Coll. W. C. Hewitson, 1867).

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\* The butterfly associated with the ♂ *Phileris* by Boisduval, and figured in *Faune Ent. de Madag. etc.*, pl. 2, f. 5, as the ♀ of that species appears to belong to a different section of the genus *Pieris*.

## Sub-family PAPILIONINÆ, Swains.

## GENUS PAPILIO, Linn.

*Papilio Ophidicephalus*, Oberth. Études d'Entomologie, p. 13 (1878).

*Papilio Menestheus* (Dru.), Trimen [*part.*], Rhop. Afr. Aust. ii. p. 320, pl. 2, fig. 1 (1866).

This is the Southern representative of *Papilio Menestheus*, Drury, but is a much larger form, no example of either sex of the West African butterfly that I have measured expanding more than  $5\frac{1}{2}$  inches across the wings. Apart from size, *Ophidicephalus* is best recognized by (1st) the more decided yellow, inclining to sulphureous, of the markings; (2nd) the greater size of all the markings, *but especially the width of the transverse band of forewings near costa and the contiguity and outwardly-truncate form of its component spots*; (3rd) the more conspicuous ocelli of the hindwings and irroration of the disc between those markings; (4th) *the much longer and basally much broader tails*. In the ♂, the discal silky clothing is barely seen on the 3rd median nervule of the forewings; and the disco-cellular oblique marking of the same wings in both sexes is not separated into two distinct spots. The dentation of the stripe of the hindwings which borders the costal ocellus is much more prolonged and acuminate.

Two male examples lately acquired by the South African Museum, which were taken by Mr. T. Ayres in the Leydenburg District of the Transvaal, are in some respects intermediate between the Southern and Tropical Western forms, though nearer to the former. In size, colouring, and development of hindwing, ocelli and tails, they are quite like *Ophidicephalus*; but in the forewings the transverse band is as narrow as in *Menestheus* (except at its costal commencement where it is somewhat broader), and its component spots are all separated from each other except the first three, though they preserve the outwardly truncate form characteristic of *Ophidicephalus*. In one specimen, moreover, the oblique marking of the discoidal cell in the forewings is divided into two parts, but the upper part remains much larger than the corresponding mark in *Menestheus*.

Mr. Druce (Proc. Zool. Soc. Lond. 1875, p. 416) has noted that the variety figured by me "seems to take the

place of the typical form in South Africa." Colonel J. H. Bowker was the first to bring to notice this very fine *Papilio*, having forwarded specimens from the Trans-Kei Territory, in 1862. Col. Bowker has since informed me that he has noticed the butterfly once or twice about King William's Town. I observed a single specimen on the coast of Natal, and the late Mr. M'Ken forwarded to the South African Museum an individual taken near D'Urban in 1866.

*Hab.*—Cape Colony: King William's Town (Col. J. H. Bowker).

Trans-Kei: Bashee and Tsomo Rivers, &c. (Col. J. H. Bowker).

Natal: D'Urban (J. M. M'Ken); between D'Urban and Verulam (R. Trimen, 1867).

Transvaal: Leydenburg (T. Ayres, 1879).



# PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON

FOR

1879.

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February 5, 1879.

Sir JOHN LUBBOCK, Bart., M.P., V.-P.R.S., President, in the chair.

The President nominated as Vice-Presidents of the Society for the year Mr. H. W. Bates, Mr. J. W. Dunning, and Mr. Frederick Smith.

Donations to the Library were then announced, and thanks voted to the donors.

### *Exhibitions, &c.*

Mr. H. J. Elwes exhibited a collection of Lepidoptera from a small island at the mouth of the Amur River, in Siberia.

Mr. C. O. Waterhouse exhibited a specimen of *Gasteracantha Cambridgei*, a remarkable spider from West Africa, recently described by Mr. A. G. Butler.

Mr. G. C. Champion exhibited a specimen of *Harpalus oblongiusculus*, taken by Mr. J. T. Harris, in May last, at the Chesil Bank, Weymouth.

The Secretary read a note from Mr. A. H. Swinton, calling attention to a passage in a paper by Mr. Wood-Mason, published in the last part of the Society's 'Transactions' (part iv., p. 265), wherein the author asks, "How is it that nobody has ever heard the *Mantidæ* stridulate?" Mr. Swinton referred to Kirby and Spence's 'Introduction to Entomology' (7th ed., p. 493), where it is stated, on the authority of M. Goureau, that *Mantis religiosa*, "when alarmed and having put itself in an attitude of defence, rubs the sides of the abdomen against the interior borders of the wings and elytra, so as to produce a noise like that of parchment rubbed together."

The Rev. A. E. Eaton remarked, *apropos* of the homologies of wing-nervures (see Proc. Ent. Soc., 1878, p. lvi.), that in the anterior wings of most of the *Ephemeridæ*, three primary groups of longitudinal nervures could be distinguished, the foremost proceeding directly from the thorax; the hindermost issuing from, or terminating in, a curved or angulated prominent fold interjacent between the first group and the hinder part of the base of the wing close to the wing-root; and an intermediate group which does not attain to the thorax, but either terminates in the wing-membrane close to the base of the wing, or is annexed to the hinder veins of the first group. The equivalents of the intermediate group in their ultimate ramifications constitute the "apical forks" of Mr. M'Jachlan's system. Mr. Eaton exhibited drawings of wings of Trichoptera and Tineina, in which the three groups of nervures were distinguished by colour, and the "apical forks" were shaded and numbered, in correspondence with their homologies.

Mr. Meldola communicated the following note on a remarkable case of mimicry observed by Dr. Fritz Müller:—"I have just reared from the caterpillar state ten specimens (being five males and five females) of *Eueides pavana*. This is one of our rarest butterflies, and I think I have not yet caught more than half-a-dozen, all of which were females. These resemble *Acræa thalia* so closely that before they are caught they can be distinguished only by the club of the antennæ being yellow, while it is black in *Acræa*. Now in the male of *Eueides pavana* the club of the antennæ is black also, and this has no doubt been the cause of my never catching any male. I know of no other case in which the males of a mimicking butterfly resemble more closely the mimicked one than the females do, while the inverse is well known to be of rather frequent occurrence."

#### *Papers read.*

Mr. A. G. Butler communicated a paper "On the Lepidoptera of the Amazons collected by Dr. James W. H. Trail during the years 1873 to 1875. Part iii., Noctuites."

Mr. C. O. Waterhouse communicated a "Description of a new Genus and Species of Rhyncophorous Coleoptera allied to *Sipalus* found in an Orchid-house."

Mr. F. Moore communicated "Descriptions of the Species of the Lepidopterous Genus *Kallima*."

#### *New Part of 'Transactions.'*

Part iv. of the 'Transactions' for 1878 was on the table; as were also copies of the President's Anniversary Address delivered at the last Meeting.

March 5, 1879.

J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Before proceeding to the business of the evening, Mr. Dunning said that it was his melancholy duty to announce the death of Mr. Frederick Smith, one of the Vice-Presidents of the Society, who had only at the preceding meeting been re-appointed to that office. He died on the 16th of February, at the ripe age of seventy-three. Appointed Curator about 1843, elected a Member in 1850, President in 1862 and 1863, Mr. Smith had throughout been one of our most useful associates. A constant attendant at our meetings, his readiness to communicate his knowledge to others was unailing, and what he did communicate was not second-hand information, but was almost invariably the result of his own personal observation. His entomological work in connection with the British Museum was known to all, and to his colleagues in that institution his loss would be irreparable. For a whole generation he has occupied the position of *the* British Hymenopterist, and in his knowledge of our indigenous species and acquaintance with their habits he stood without a rival. Retiring and unassuming in manner, he possessed a quiet sense of humour, and amidst the warmth and unrestraint of a social gathering exhibited a capacity for entertaining others which was probably unsuspected by many who knew him only in this room. Blameless in private life, a conscientious public servant, earnest and laboriously painstaking in his work, Frederick Smith had gained the esteem of all, and the Chairman felt that he was truly interpreting the feelings of others when he said that the Society had lost a valuable Member and his colleagues a faithful friend.

Donations to the Library were then announced, and thanks voted to the donors.

*Election of a Foreign Member and Subscriber.*


M. Ch. Brongniart, of the Musée d'Histoire Naturelle, 57, Rue Cuvier, Paris, was balloted for and elected a Foreign Member.

Mr. John T. Harris, of Newton Road, Burton-on-Trent, was balloted for and elected a Subscriber.

*Exhibitions, &c.*

Sir Sidney Saunders exhibited a series of bees belonging to the genus *Halictus* from Greece. Among them were several remarkable new forms of the males.

Mr. Wood-Mason, with reference to the extract from Kirby and Spence's 'Entomology' read by the Secretary at the last meeting, stated that he had

since carefully re-examined *Mantis religiosa*, but that he had found both wings and tegmina to be perfectly unmodified; no rasp was developed on the anterior margin of the tegmina, and no structure that is not to be found in any orthopterous insect could be detected on the inner margin of either pair of wings, the parts said by Goureau to be rubbed. In fact, it is perfectly clear that the sounds which Goureau caused the *Mantis* to emit were nothing more than such a rustling noise as any Orthopteron can make by shuffling all its organs of flight together, or by the friction of the sides of the abdomen against the posterior inner margins of the wings and tegmina by such a rapid up-and-down movement of the abdomen as should be particularly easy and natural to a member of a group of insects, many of which (e. g., *Mantis*, *Hierodula*, and all the *Empusidæ*) habitually carry the abdomen strongly recurved over the thorax throughout their larval life. To enable the insect to bend the body upon itself in this fashion, the first—and sometimes also the second—dorsal segment of the abdomen is peculiarly emarginate. Both dried and alcoholic specimens of immature *Empusidæ* are invariably received in this attitude, , and cannot be straightened without breaking the interarticular membranes of the abdominal segments, the dorsal muscles being so strongly contracted and rigid. The attitude probably acts protectively by enabling the insect to diminish the amount of surface visible to an enemy, the short and stout forms and species with a broad exfoliated abdomen (like the *Empusidæ*) alone assuming it; the long, slender, and filiform species being apparently already sufficiently well protected by their resemblance to sticks and stalks. It is interesting to find this larval trait continued on into adult life in the South-American *Acanthops*, according to De Saussure, whose statement I can corroborate so far as to say that I have always seen dried specimens of the female in the attitude described by him whenever they have been pinned as caught, without any attempt at “setting” on the part of the captor:—

“Au repos ces insectes (*Acanthops*) se donnent par leur posture une ressemblance de plus avec des objets végétaux. Chez les femelles la base du 1er segment dorsal de l’abdomen est échancrée, ce qui permet à l’abdomen de se rejeter en dessus et de prendre une direction verticale; dans ce mouvement il entraîne les organes du vol et les oblige de se placer à angle droit sur le prothorax; les élytres étant trop étroits pour recouvrir le large abdomen, formant alors avec les ailes comme un faisceau de folioles chiffonnées, enveloppant un fruit folliculé. Chez les mâles les élytres et les organes du vol étant plus grands, et ne se rejetant pas en haut, ils dérobent entièrement l’abdomen, et par leur superposition ils figurent une feuille à bords sinués. La nuance de la couleur feuille-morte varie d’un individu à l’autre comme les feuilles desséchées.”\*

\* ‘Mém. Mexique,’ tom. ii., 1, p. 149.

The following are M. Goureau's observations referred to by Mr. Swinton at the last meeting:—

“La *Mante religieuse* habite les côteaux les plus exposés au midi des environs de Besançon, c'est le point le plus septentrional de la France où je l'ai rencontrée. J'ai gardé et nourri une de ces *Mantes* pendant plusieurs jours en la tenant renfermé dans une boîte et en lui donnant des mouches. La première fois que je la renfermai, je l'irritai en la touchant avec une plume, et en même temps je fis entendre un petit sifflement. Dans la crainte d'être saisie par un ennemi, à ce que je suppose, elle se mit aussitôt en état de défense; elle releva verticalement son long corselet, porta ses pattes antérieures en avant, comme pour saisir sa proie, elle étala à demi ses ailes et ses élytres, et fit mouvoir son abdomen de haut en bas par un mouvement assez rapide, pendant ce mouvement, les côtés du ventre frottaient contre les bords intérieurs des ailes et des élytres, et produisaient un bruit analogue à celui qu'on obtient en froissant du parchemin. Depuis ce premier mouvement jusqu'au dernier jour où je l'ai gardée, chaque fois que je la visitais et que je faisais entendre le même sifflement, elle prenait aussitôt son attitude défensive, et ne la quittait que lorsqu'elle jugeait le danger passé. Cette expérience semble prouver que l'on peut instruire certaines insectes à comprendre la signification des sons et leur apprendre à répondre à un appel qui leur est fait, ce qui peut être très utile dans les expériences sur l'audition; elle prouve en outre que les *Mantes* jouissent de la propriété de produire une stridulation analogue à celles des *Copris*, *Geotrupes*, *Cychnus*, *Necrophorus*, &c.”\*

Mr. W. Cole called attention to a statement in Dr. Kerner's essay “On Flowers and their unbidden Guests,” respecting the cause of blossoms being as a general rule untouched by caterpillars. Dr. Kerner presumes that flowers contain certain principles distasteful to larvæ, and are so protected from their attacks. Mr. Cole suggested that the majority of caterpillars neglect flowers as food rather with a view to their own safety than because the blossoms repel them by exhibiting unwelcome taste or odours. Most larvæ find concealment among leaves and twigs which they resemble in colour and markings, and it would be to their disadvantage to wander on to brilliant flowers, where their natural protective clothing would lose its special value. Flowers can hardly be essentially distasteful to these creatures, because many species of caterpillars, and even entire genera, feed commonly on parts of the inflorescence; but in the habits and colouring of these, other modes of deceiving their enemies or escaping from them can in most cases be detected.

Mr. M'Lachlan said he had pointed out long ago the fact that many larvæ varied in colour in accordance with that of the flowers on which they

\* ‘Ann. de la Soc. Entom. Fr.,’ tom. x., Bull. p. xvii., xviii.

fed, and he was disposed to think there was something in the idea that they found protection thereby.

Mr. Meldola saw no objection to Dr. Kerner's statement, from the point of view of vegetable physiology, since it is quite possible for flowers to secrete special chemical compounds quite distinct from anything found in other parts of the plant. With regard to larvæ which feed upon flowers to which they are adapted in colour, it is not improbable that such adaptation may result from the actual presence of the colouring matter of the flower in the tissues of the larvæ, the digestive organs of which may have become modified by natural selection, so as to permit of such permeation of unaltered colouring matters. In the case of green caterpillars unaltered chlorophyll had been detected spectroscopically in the tissues.

Mr. H. J. Elwes mentioned a case of injury done to a species of *Sternbergia* by some larva feeding in the bulb. Mr. M'Lachlan suggested it was probably that of the dipterous genus *Merodon*, which is known to attack bulbs of various plants.

*Papers read.*

Dr. Sharp communicated a paper "On some Coleoptera from the Hawaiian Islands."

Mr. Peter Cameron communicated a paper "On some new or little-known British Hymenoptera."

*New Part of 'Transactions.'*

Part V. of the 'Transactions' for 1878, containing index, title-page, &c., was on the table.

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April 2, 1879.

J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

*Exhibitions, &c.*

Mr. M'Lachlan exhibited the cases and sixteen species of Brazilian caddis-flies, with the insects bred from the larvæ that manufactured some of them, sent to him by Dr. Fritz Müller, from Santa Catharina. Included were the cases exhibited at the meeting of the 4th December last. Some extracts (with notes) from Dr. Fritz Müller's letters are here given:—

"*Helicopsyche*. In some cases of one of the species you will see, well preserved, the oldest part of the case, which peeps out like a chimney from the conical top. There are here two or three other species of *Helicopsyche*, one of which lives on rocks continually wetted by the spray of waterfalls:

the pupa of this species is deprived of the long hairs which exist, in other species, on the first four joints of the fore and middle legs, and which the pupæ, after leaving the case, use in swimming to the surface. On the rocks it is, of course, neither necessary nor possible to swim. Should not Brauer's *Satotricha* be a *Helicopsyche*? the neuration of the wings is very similar to that of our species.\* In the pupa of *Helicopsyche ceylanica*, Brauer ('Voyage der Novara,' Neuroptera) describes the first joint of the maxillary palpi in either sex as being much shorter than the second; but this is not the case with our species, which in their maxillary palpi agree with *Satotricha*. Perhaps there may not be any real difference in this respect between *H. ceylanica* and the Brazilian species. Brauer's figure of the palpi of *Helicopsyche* looks as if there were something wanting at the base. There are several other differences between the larvæ and pupæ of *Helicopsyche* I have examined and Brauer's description of *H. ceylanica*; whether they be real or not I am unable to decide. The anterior margin of the pronotum of the larva is armed, in our several species, with a row of strong spines, straight or curved at the end. The branchiæ described by Brauer I have been unable to find in any of our species. The hooks at the apex of the abdomen are quite different from Brauer's description. The lateral tubercles of the first segment of the abdomen are beset with pairs of microscopical spines. In describing the legs of the pupa, Brauer says that the skin of the pupa bears but few hairs; if indeed the fore and middle legs of the pupa were hairless, or nearly so, *H. ceylanica* would probably not live in the water, but on wet places, where the pupa is not obliged to swim. According to Brauer there should be a pair of horny plates, armed with hooks, on the back of abdominal segments 2—6; in our species these exist only on segments 3—6, but there is a second pair on segment 5, with the hooks curved in an opposite direction. Brauer's figure of the apex of the abdomen shows it as deprived of appendages. I cannot help thinking this must be an error; all our species have well-developed appendages bearing the usual four long hairs.

"The pupæ of a species of *Hydropsychidæ* living on the same rocks here likewise have hairless legs, and this is also the case with the species of *Leptoceridæ* which inhabits *Bromeliæ*, while, in a closely allied species † living in rivulets, the hairs on the fore and middle feet are well-developed, as you will see by the pupa-skins I send you.

\* I have already called attention to the probability that *Satotricha* may be allied to *Helicopsyche*, in my 'Revision and Synopsis of European Trichoptera' (pt. v., p. 269, Nov. 1876).—*R. M.L.*

† This insect belongs to Section iv. of *Leptoceridæ*, according to the system adopted in my 'Revision and Synopsis of European Trichoptera.' It probably forms a new genus allied to *Anisocentropus* and *Ganonema*. The cases of it, and of that inhabiting the *Bromeliæ*, are formed of large pieces of leaves (or entire small leaves) attached flatly in a longitudinal manner.—*R. M.L.*

“Of the other species I send you, one agrees in almost every particular with Brauer’s description of the New Zealand genus *Tetracentron*, so that I presume it will belong to that genus.\* The larva lives in hollow sticks of wood; but, where the black *Dentalium*-like tubes abound, it sometimes usurps the tubes of this latter species. The tubes described by Hagen (Stett. Zeit., 1864, p. 226, No. 23) as *Leptocerus?* *grumicha*, Vallot, must have been inhabited by strangers, for they were closed by stones, whereas the legitimate owners make a circular corneous operculum, with a sub-central opening. Though these black tubes are extremely abundant in some places, I have only a few ill-preserved insects, which I hope to replace by better ones.†

“There is another smaller species which also lives in the tubes made by different Trichoptera, and which has the curious custom of fixing to the mouths of the usurped cases sticks of wood. Even to a practised eye it is often difficult to discover them among the irregular straggling sticks. I have not yet bred the insect of this species, but judging from the structure of the larvæ it must be nearly allied to *Tetracentron*.

“*Hydroptilidæ*. The cases of my former letter, which you were inclined to doubt as belonging to Trichoptera, are those of *Hydroptilidæ*. I have often reared the imago. The family appears to be very rich here. I already know the larvæ of eleven or twelve species. The most curious of them are two species which, no doubt, form a new genus (*Peltopsyche*). The larvæ live in fixed flat shield-like cases, resembling the egg-cases of *Nephelis*, transversely striated in one species (*P. Sieboldi*), smooth in the other (*P. Maclachlani*). The antennæ of the male are very curious, and very different in the two species. Spurs 2.4.4. The antennæ of *P. Sieboldi* are 13-jointed in the male, and the number is probably the same in *P. Maclachlani*; in the female the joints are more numerous.‡

“*Chimarrha?* The larvæ of some *Rhyacophilidæ* (*Chimarrha?*) live in movable cases. These larvæ remove the ventral wall of their houses before fixing them to some stone.

“The number of species of Trichoptera that I have seen here, either in the larval or perfect state, is about forty.”

\* It does agree with *Tetracentron* in almost every particular.—R. M.L.

† These black tubes have probably been described as actual shells of *Dentalium*. Vallot (Mém. Acad. Dijon, 1855) cites doubtfully *Dentalium corneum*, Gmelin, which has since been referred as the case of a Trichopterous insect, as identical therewith, and renames it *Phryganea grumicha*. The insects sent by Dr. Fritz Müller belong to the *Leptoceridæ*, but to an undescribed genus of uncertain affinities.—R. M.L.

‡ The structure, and especially the habits, of *Peltopsyche* differ so much from other *Hydroptilidæ* that one is tempted to doubt if it really belong to the family.—R. M.L.



In connection with the habits of the Mantidæ—a subject which had been recently brought under the notice of the Society by Mr. Wood-Mason and others—Mr. Stainton remarked that on March 20th, 1866, he received a letter from Mr. Moggridge, jun., stating that he had forwarded a caterpillar “and also a curious grasshopper(?)” The latter was enclosed in a box, from which, on being opened, there jumped out a little creature which he had no difficulty in recognising as a young *Mantis*. It was of a whitish green colour, and may possibly have been the young larval form of *Mantis religiosa*. It was placed back in the box, and the next morning again examined, the long anterior segment of the thorax and the peculiar anterior legs leaving no room for doubt that the specimen, in spite of its hopping movements, was a young *Mantis*. It was again turned out of the box, and again made little jumps, not such springs as would be taken by a grasshopper, but still there was that in its movements which quite justified Mr. Moggridge, who, although a first-rate botanist, has not yet turned his attention to Entomology, in calling it “a curious grasshopper(?)” De Geer observes (vol. iii., p. 401) that “les *Mantes* approchent beaucoup des Sauterelles, quoiqu’elles ne puissent pas sauter.” Mr. Stainton was of opinion that this peculiar motion of the baby *Mantis* is one of those cases to which Mr. Darwin has called attention, *viz.*, that the relationship and affinities of animals are often more expressed in the embryonic than in the adult form.

Sir Sidney Saunders exhibited a bag, said to be the production of a large species of spider, brought from the Fiji Islands by Mr. Henry Selfe, engineer on board a steamship trading between those islands and New Zealand. A similar specimen is said to be in the Auckland Museum. The natives are stated to split bamboos and to place the pieces in the form of a bag in the track of the spiders, and when covered by these the slips of bamboo are drawn out. It is believed that the natives make cloth of these webs. This information was obtained from another Englishman who had resided four years in these islands.

The Chairman pointed out that, supposing subsequent inquiries to confirm these statements, this would probably be the first known case of an articulate animal being made to manufacture *directly* a fabric useful to man.

The Secretary read the following note by Mr. J. W. Slater:—

“*On Insects destroyed by Flowers.*”

“Whilst it is generally admitted that the gay coloration of flowers is mainly subservient to the purpose of attracting bees and other winged insects, whose visits play so important a part in the process of fertilization, it seems to me that one important fact has scarcely received due attention. Certain gaily-coloured, or at least conspicuous, flowers are avoided by bees, or, if visited, have an injurious and even fatal effect upon the insects.

Among these are the dahlia, the passion-flower, the crown-imperial, and especially the oleander. That the flowers of the dahlia have a narcotic action both upon humble-bees and hive-bees was first pointed out, I believe, by the Rev. L. Jenyns, in his 'Observations in Natural History' (p. 262). He mentions that bees which visit these flowers are 'soon seized with a sort of torpor,' and often die unless speedily removed. He quotes also a writer in the 'Gardener's Chronicle,' who pronounces the cultivation of the dahlia 'incompatible with the success of the bee-keeper.' I find it also recorded that the passion-flower stupifies humble-bees; that bees of all kinds avoid the crown-imperial and the oleander, and that the honey of the latter is fatal to flies. I cannot call to mind that I ever saw a butterfly or a moth settled upon the flowers of this shrub in Hungary and Dalmatia, where it is very abundant. It seems not unimportant to ascertain whether the above-mentioned phenomena have been verified by other observers; whether any other insects, in such cases, undertake the functions generally exercised by bees, and whether other flowers have a similarly noxious or deadly action upon insects."

*Papers read, &c.*

The Secretary also read a paper communicated by Miss E. A. Ormerod, entitled "Observations on the Effects of low Temperatures on Larvæ," in which the authoress comes to the conclusion that of all the species belonging to different Orders examined during the severe frosts of the past winter, none were materially injured by the low temperatures to which they were subjected. Specimens in illustration of the paper were exhibited.

Mr. Stainton remarked that although he fully agreed with Miss Ormerod that insects did not suffer directly from cold, yet he knew of two instances during the past winter in which a great loss of insect-life had ensued, owing to the leaves tenanted by mining larvæ having been killed by the severe frost. It was the habit of the larva of *Lithocolletis messaniella* to feed up during the winter months in the leaves of the evergreen oak (*Quercus Ilex*), and the effect of the extreme cold had been to kill the leaves of many trees of *Q. Ilex*, which were now quite leafless, although others similarly placed seemed to have escaped unhurt. Where a leaf containing a mining larva had been killed, the latter, unless capable of quitting the leaf to seek fresh food,—a power which no larva of the genus *Lithocolletis* possessed,—had necessarily died of starvation. On those trees of *Q. Ilex* which had escaped injury from the cold, Mr. Stainton had found that these larvæ were much less developed than was usual at this period of the year, and hence he anticipated that the moths which should appear at the end of April would be delayed beyond their usual time. The other instance he had noticed was that of the larva of *Tischeria marginæa*, which fed up during the winter months in the leaves of the bramble; in the neighbourhood of Lewisham

almost every leaf of bramble had been totally killed by the frost, and of course the in-dwelling larvæ had perished for lack of food.

Mr. M'Lachlan stated that it was generally believed that wet winters were far more destructive to insect-life than dry cold ones, however severe.

Mr. W. Cole asked whether the insects observed by Miss Ormerod were actually frozen throughout, since it seemed to him improbable that the vital fluids in the tissues could be solidified without causing death. It was known that when the protoplasm of the leaves of trees was actually frozen the leaves were killed.

Miss Ormerod stated that some of the larvæ observed by her enclosed in frozen earth were in a state of brittleness when taken out, but nevertheless recovered on being thawed.

Mr. M'Lachlan was of opinion that animals might be frozen throughout into a state of perfect rigidity, and yet recover when thawed. He instanced the case of a fish which had been found in this condition imbedded in ice, and which had recovered on thawing.

Mr. W. L. Distant communicated a paper containing "Descriptions of new Species of Hemiptera collected by Dr. Stoliczka during the Forsyth Expedition to Kashgar in 1873-74," to form portion of the general work on the scientific results of the Expedition, now in course of publication at Calcutta.

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May 7, 1879.

J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to donors.

*Election of a Foreign Member.*

Prof. N. Joly, of Rue des Châlets, Toulouse, was balloted for and elected a Foreign Member.

*Exhibitions, &c.*

Mr. H. J. Elwes exhibited a fine collection of Lepidoptera from Asia Minor, and read the following note:—

*"On a Collection of Butterflies from Asia Minor."*

"For the collection which I now exhibit I am principally indebted to Dr. Staudinger, of Dresden, who has recently worked up the results of his own and other collectors' work in Asia Minor, and has been good enough to send me advance sheets of the paper he has written on them.

"There is nothing in the situation, climate, or vegetation of Asia Minor which would lead one to expect much difference in its insect fauna from

that of other parts of the Mediterranean region; but notwithstanding that large parts of the country are still quite unexplored, the material at hand is enough to show that Asia Minor probably contains a larger number of species of Rhopalocera than any other part of the Palæarctic region.

“The only districts in which the insect fauna has been at all carefully studied are, first, those of the Eastern Taurus, above Tarsus, where Joseph Haberhauer spent two seasons in collecting. The climate of the plains in this part of Asia Minor is excessively hot, moist and unhealthy during summer and autumn, whilst that of the mountains is drier and cooler. The whole of the Taurus ranges west of Messina remain unvisited by a naturalist, and will certainly be found extremely rich and interesting, especially in Lycia and the neighbourhood of Adalia. Secondly, the environs of Broussa, in the north-west, have been well worked by Mann, who spent the seasons of 1851 and 1863, and found the fauna extremely rich. In the west, north, and north-east, Lederer and Kindermann have made several collecting tours, the neighbourhood of Amasia being found not only the richest locality in Asia Minor, but, as far as I am able to judge, it is for its situation one of the richest in the world. Dr. Staudinger also visited Amasia in 1875, and collected most of the species now exhibited. The high ranges of Armenia and Lazistan will doubtless prove very rich, though the climate is much colder and damper than in the south and centre of the country.

“A glance at the collection will show that the majority of the species are identical with, or very nearly allied to, those of Southern and Central Europe; but in addition to the European species, of which not many are absent, we have a number peculiar to Asia Minor, or only found to the east of it. Taking the genera first, we find that the only European ones not found in Asia Minor are *Æneis* (*Chionobas*), *Nemeobius*, *Triphysa*, and *Cyclopides*, the last of which, as well as *Charaxes* and *Danaïs*, are nearly sure to be found on the south coast, though not as yet discovered. In place of these we have the following, which do not occur in Europe generally:—*Doritis*, a purely Levantine genus; *Zegris*, only found in Spain and S.E. Russia; *Thestor*, only on the coast of France and Spain; *Cigaritis*, a N. African and Syrian genus; and *Thaleropsis*, peculiar to Asia Minor. An analysis of the genera gives the following results:—Total number 37, against 44 in the whole of the Palæarctic region, of which about thirty are found in Europe generally, and three or four more in various parts of the Mediterranean subregion.

“Of these thirty-seven genera, seven—viz., *Doritis*, *Thais*, *Legris*, *Anthocharis*, *Thestor*, *Cigaritis*, *Thaleropsis*—are peculiar to or highly characteristic of the Mediterranean subregion; two, *Parnassia* and *Colias*, are characteristic of Alpine and Arctic regions generally; seven—namely, *Leucophasia*, *Polyommatus*, *Melanargia*, *Satyrus*, *Epinephele*, *Canonympha*, and *Spilothyris*—seem to be most characteristic of Europe and the

Palæarctic region generally, whilst the remainder are cosmopolitan in their distribution.

“As regards the species, the most remarkable facts are the large number of *Lycæna* and *Satyrus*, no less than forty-three of the former and eighteen of the latter being included, so that about two-sevenths of the whole number is made up of these genera, which appear to reach their highest development in the country. The only dominant genus in Europe which is not well represented in Asia Minor is *Erebia*, of which we have only four kinds against twenty in some districts of Central Europe; other species, however, probably remain to be discovered. An analysis of the species gives the following approximate results:—

	Species.
Species peculiar to Asia Minor, of which about half are very nearly allied to European species - - - - -	26
Species peculiar to Asia Minor and countries to the east and north-east of it, as S. Russia, N. Persia, Syria - - - - -	18
Species common to Asia Minor and Southern or South-Eastern Europe	40
Species common to Asia Minor or Europe—many of these found also in Western Asia - - - - -	61
Species found very generally over the whole Palæarctic region - - - - -	51
	196”

Dr. Wallace exhibited a collection of Lepidoptera made by his son in the United States of Columbia.

Mr. W. L. Distant exhibited a West African specimen of the large water-bug, *Hydrocyrius Columbiae*, Spin., common also to Madagascar and the Neotropical region. Similar in general appearance to the genus *Belostoma*, *Hydrocyrius* is at once recognised by the possession of two fore tarsal claws; and in reference to the use of the tarsal claws generally, Mr. Distant read extracts from a letter received from Mr. George Thomson, of the Calabar district. That gentleman had forwarded a drawing of *H. Columbiae*, and stated that when he first obtained the insect he placed it in a large basin of water, but observing it to float helplessly on the surface, he placed a few small stones on the bottom, and to these it at once clung tenaciously. On being afterwards transferred to a fish-globe, Mr. Thomson describes it as “clinging most furiously to the stones,” and when lifted as “raising a stone as large as a small hen’s egg.” Mr. Distant thought the insect was probably a denizen of rapid currents, and by its tarsal claws thus prevented itself from being swept away.

The Secretary exhibited a specimen, in alcohol, of a trichopterous insect, showing tracheo-branchiæ, sent from Brazil by Dr. Fritz Müller, who communicated the following note concerning it:—

“I send you enclosed a trichopterous insect belonging to the family *Leptoceridæ*, which shows very distinctly the branchiæ lately discovered in

the imago stage of this order by Dr. Palmèn,\* of Helsinberg. As these branchiæ cannot be readily seen excepting immediately after transformation, I think many members of the Entomological Society may not yet have seen them. I may add that Dr. Palmèn's view, that the branchiæ persist in all those Trichoptera the larvæ and pupæ of which possess them, does not hold good. At least in one species of *Leptoceridæ* I have observed that they are cast when the pupa undergoes its final transformation."

Mr. M'Lachlan said that the discovery by Dr. Palmèn of branchiæ in the perfect insects of many Trichoptera was an extension of the observations originally made by Newport,† and after him by Gerstäcker and others, as to the existence of branchiæ in the imagos of various *Perlidæ*. Dr. Palmèn appeared to be of opinion that these persistent branchiæ serve no functional purpose in Trichoptera, and alludes to them more particularly as proving that the branchial system of the larva and the stigmatic system of the imago have no genetic connection, since in the imago branchiæ and stigmata may exist side by side. Mr. M'Lachlan further alluded to the existence of marked branchial filaments in the imago of various other genera of European Trichoptera not especially alluded to by Dr. Palmèn, such as *Dipletrona*, *Plectrocnemia* and allies, *Ptilocolopus*, &c., and thought they might yet be found to serve a functional (respiratory) purpose. The insect sent by Dr. Fritz Müller showed two or three branchial filaments on each side of most of the abdominal segments.

Dr. Wallace remarked, in reply to an inquiry of Mr. Sheppard's about his silk-worm experiments, that he had experimented with nearly every kind of silk-worm which had been introduced into Europe, and that he had come to the conclusion that the only one which would pay to cultivate in this country was *Bombyx Mori*. It was true that the *Ailanthus* moth and others would produce a silk; but inasmuch as manufacturers, brokers and silk-merchants had invested large sums in the produce of *B. Mori*, they were not disposed to look with an eye of favour upon any other produce, which certainly would require much alteration in machinery and in the arrangements for business now extant. Moreover, the product of *B. Mori* was a very superior article to that produced by any other worm. It was true that in India, China and elsewhere native products were prepared from cocoons of indigenous moths, as, for instance, the Tusser-silks from *Antheræa Paphia*; Moonga-silk from *Antheræa Assama*; Pongees, from China and Japan, from the cocoons of the *Ailanthus* moth and of *B. Pernyi*; likewise a very valuable silk from the Japanese oak-feeding *B. Yama-Mai*; and he thought that the cocoons of the species feeding on the gum-trees near Adelaide, New South Wales, which were exhibited that evening to the Society, might be utilised in a similar manner. But none of these silks

\* 'Zur Morphologie des Tracheensystems,' 1877.

† Ann. & Mag. Nat. Hist. 1844. Trans. Linn. Soc. xx. p. 425 (1851).

were adapted to the machinery now in use in Europe, and therefore it would be better to allow native industry to collect the produce and fabricate the silks in the countries where produced. "With regard to my experiments with the *B. Mori*," Dr. Wallace further remarked, "they go to indicate that a good profit may be expected from the production of grain. It is well known that for years past the silk-producing countries of Southern Europe have been unable to produce healthy grain—*i. e.* eggs free from disease—for the next season's crop; they have therefore gone elsewhere for sound grain, and have even sent as much as a million pounds sterling in one year to Japan for this purpose; but the grain of Japan no longer serves their purpose. The temptation of high prices drew from Japan at first all their best stock, and that which is now left is in consequence much deteriorated; disease has also visited even Japan, so that Japanese grain cannot be relied upon. Other countries, therefore, are now contributing their supplies, notably North and South America, Switzerland, Northern Germany, Cashmere, Australia, &c.; but Australia labours under a serious disadvantage,—although she can produce magnificent cocoons and a most healthy grain, yet the different seasons of different hemispheres prevent the Australian grain produced in December and January from obtaining the necessary rest and hyemation which would ensure a proper incubation. The fine and temperate climate of England gives us a great advantage in producing healthy grain. It is notorious that our climate during the last fifty years has altered, being hotter and drier than formerly, at least in the months during which silk-worm culture is carried on, *viz.* July, August and September. I have found no difficulty in carrying out my education at Colechester, and have produced a very healthy grain. I have planted about two acres of land with mulberry trees, and as these grow up my experiments will be further developed. 1 oz. of grain will, if properly cultivated, produce from 80 to 100 oz., and the retail price of an ounce of good grain is 21s., consequently if 1 oz. only produced 50 oz., which were disposed of at 10s. per oz., there would be a large margin of profit. I have sent my grain to North and South America, Italy and elsewhere, and it has been pronounced very good and free from disease. At the present time, when low prices and bad harvests press very heavily upon agriculturists, I think that the subject of sericulture, from the grain-producing point, ought to be seriously considered. As to the production of cocoons, this might be done; but as grain production pays so much better, I would advise that to this most serious attention should be paid."

Mr. Meldola exhibited, on the part of Sir John Lubbock, specimens of three species of moths belonging to the family *Bombycida*, with eggs, cocoons and larvæ, sent from South Australia, together with some notes on their life-histories, by Mr. George Francis, of Adelaide. These moths, the larvæ of which are stated to feed on the native gum-trees, were respectively

a species supposed to belong to the genus *Gastropacha*, *Opsirhina feroens*, Wlk., and *Anapæa (Oxleyi, Newm.)*? The first-named species, which is said to be rather rare, forms a tough green silken cocoon. The *Opsirhina* was captured on October 25th, 1878, and laid eggs which hatched twenty days afterwards: the caterpillar (full-grown?) "is about  $3\frac{1}{2}$  inches long, with a curious horn on its head," and appears abundantly only every few years: it spins a cocoon of white silk. The caterpillar of the *Anapæa* (specimens of which, preserved in spirit, were exhibited) is described as being, when alive, of "a bright emerald-green, with red and pink markings on the back, and yellow, black and white streaks on the sides. They have no abdominal legs, but a sort of soft adhesive cushion by which they crawl and adhere to things." They are further stated by Mr. Francis to possess "a set of four little battlements of darts, which, when quiescent, lie flat down, but when the insect is irritated they stand up and are pushed forcibly against anything that approaches them, and they sting just like a nettle." The male larva is smaller than the female, the latter growing to about an inch in length, while the former does not exceed five-eighths of an inch, and possesses all the brilliant colours, the female having no red markings, but only white, yellow and green, with a little black. They appear about the middle of August on the Mallu gums, make their cocoons in four or five weeks, and the moths emerge in January: they open the top of the cocoon by cutting a circular orifice. The little cocoons, being very hard, are used as whistles by the country children. The moths are not very common near Adelaide, but are met with on the hills abundantly.

Dr. Wallace, after examining the cocoon of the *Gastropacha*, stated that it looked very promising as a source of silk.

Mr. Meldola pointed out, with regard to the *Anapæa*, that this insect, according to Mr. Francis's statement, displayed the remarkable and exceptional character of sexual difference of colour and marking in the larval condition.

Mr. M'Lachlan read the following note, extracted from a letter, dated April, received from his nephew, Mr. W. J. Wilson, Assistant Engineer, P.W.D., located on the Anapshahr Branch of the Ganges Canal, near Meerut:—

"We have had an enormous flight of locusts here. I have seen them several times before, but never in such numbers, and they have unfortunately chosen this as their breeding ground. They appeared early last month, and covered a tract of country about fifteen miles long by two or three miles in breadth, and move gradually northwards up the Anapshahr Branch. They laid their eggs all over the place, and these hatched in large numbers before the end of the month, the ground being now covered with little black larvæ about three-eighths of an inch long. They cannot fly, and now is the only chance of destroying them. The plan which has, I believe, been



found successful is to dig trenches about one foot deep and sweep the larvæ into them. They can walk and also hop about six inches. When a sufficient number are in the trench the earth is filled in. I have spoken to many villagers about it, but being fatalists they appear very callous. I hope to get the collectors to take up the matter, as I cannot do much by myself. The locusts did considerable damage to peas and mustard crops, but not much to grain, which is now being cut. Sugar-cane and indigo are being sown, and the young larvæ will cause much damage to these crops unless they are got rid of. There are such enormous numbers of them that anything but united action on the part of the villagers is useless, since a man may clear his own field, but unless the neighbouring fields are also cleared it will be as bad as ever in twelve hours."

*Papers read.*

Dr. Fritz Müller communicated a paper entitled "Notes on the Cases of some South Brazilian Trichoptera."

Mr. Wood-Mason read "Morphological Notes bearing on the Origin of Insects," and exhibited microscopical preparations in illustration.

*New Part of 'Transactions.'*

Part I. of the 'Transactions' for 1879 was on the table.

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June 4, 1879.

H. W. BATES, F.L.S., F.Z.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to donors.

Among the donations, the Secretary called attention to a copy of the first volume of Mr. W. H. Edwards's 'Butterflies of North America,' which the author had had specially coloured for presentation to the Society.

Mr. J. W. Dunning, on the occasion of the thirtieth anniversary of his election into the Society, presented to the Library a copy of Doubleday, Westwood, and Hewitson's 'Genera of Diurnal Lepidoptera,' for which a vote of thanks was proposed by Sir Sidney Saunders, seconded by Mr. S. Stevens, and on being put to the meeting was carried by acclamation.

*Election of Members and of a Subscriber.*

Mr. J. Walhouse, F.R.A.S., of 9, Randolph Crescent, Maida Vale, was balloted for and elected an Ordinary Member. Senor Antonio Augusto de Carvatho Monteiro, 72, Rua do Alcerion, Lisbon, was balloted for and elected a Foreign Member. Mr. C. H. Goodman, of Kearsbrook Lodge, Lesness Heath, Kent, was balloted for and elected a Subscriber.

*Exhibitions, &c.*

Mr. M'Lachlan called attention to a notice by Prof. F. A. Forel, published in the 'Procès-Verbaux de la Société Vandoise des Sciences Naturelles' (séance du 5 Decembre, 1877), concerning certain sculptured markings on cretaceous pebbles from the shores of Lac Léman. Various theories had been propounded to explain the cause of those markings, such as the action of Algæ, Mollusca, &c. Prof. Forel had, however, come to the conclusion that they were mainly due to the action of larvæ of Trichoptera, which formed galleries over the surface, and there were larger and deeper depressions in the places where the cases were fixed. Mr. M'Lachlan had received from Prof. Forel, through Capt. Marshall Hall, certain of these larvæ in alcohol, and two plaster casts of small blocks (exhibited), one of Jurassic limestone, the other of ordinary white chalk, the latter being one of several placed in the lake by Prof. Forel on the 12th March, and taken out on the 26th November following, and on which he had scratched his initials; these scratches had been deepened in some places by the action of the larvæ, which apparently were those of the genus *Philopotamus* in the family *Hydropsychidæ*.

Mr. Meldola suggested that the depressions in the pièces of chalk and limestone might have been produced by the solvent action of the water charged with carbonic acid, which issued from the galleries of the larvæ, a circulation of oxygenated water being necessary for their respiration, and after being used for this purpose the effluent water would naturally contain more carbonic acid than before its entry into the galleries; but this explanation would not hold good if the casts themselves had been directly acted upon by the larvæ.

*Papers read, &c.*

Mr. J. S. Baly communicated a paper entitled "An Attempt to point out the Differential Characters of some closely-allied Species of *Chrysomela*, chiefly those contained in Suffrian's 11th group; also Descriptions of some hitherto uncharacterised forms belonging to the same and other Genera of the Family."

Prof. Westwood communicated two papers, entitled "A Decade of new *Cetoniidæ*," and "On some unusual Monstrous Insects."

Mr. W. L. Distant read a paper entitled "Contributions to our Knowledge of the Hemipterous Fauna of Madagascar."

Sir Sidney Saunders communicated the following notes from M. Jules Lichtenstein, of Montpellier, describing the metamorphoses of the blister-beetle, which, after repeated failures for many years, he had recently succeeded in rearing from the egg. The most remarkable circumstance connected with these transformations or "hypermetamorphosis" (as in

*Sitaris*, *Zonitis*, and other *Meloïdæ*\*), is the retrogression to an antecedent larval form, developed within the "pseudo-chrysalis," thus constituting a *pseudo-nymph* stage (No. 6), intermediate between that of the pseudo-chrysalis (No. 5) and the true nymph (No. 7):—

"Montpellier, 27 Mai, 1879.

"J'ai réussi à élever le *Cantharis vesicatorix* jusqu'au bout, et comme j'ai fait tout l'élevage en tubes de verre j'ai pu suivre jour par jour les métamorphoses et recueillir toutes les dépouilles. Il y en a sept:—

"No. 1. Le *triangulin*, brun avec une ceinture blanche (meso- et meta-thorax et 1<sup>er</sup> segment abdominal), 2 soies caudales, yeux très marqués; il mange l'œuf, ou la larve jaune sur le miel, de la '*Ceratina*'; mais il n'attaque ni l'œuf ni la larve s'il n'y a pas le miel approvisionné à côté; son instinct lui indique probablement que son existence n'est assurée que s'il y a le miel tout prêt pour sa seconde forme.

"No. 2. Larve blanche, sans soies caudales et avec les yeux obsolètes: celle-ci ne mange que du miel.

"No. 3. Autre larve comme la précédente, mais un peu plus grosse; yeux encore plus obsolètes; mâchoires plus larges; ne mange que du miel.

"No. 4. Autre larve tout-à-fait aveugle; avec mâchoires très larges et un peu brunâtres; ongles forts propres à fouir; apparence d'une larve de *Scarabæoïde*. Elle s'enfonce sous terre. Ces 4 larves ont eu besoin de cinq à six jours chacune pour grossir et changer de peau. Après s'être enfouée sous terre cette 4<sup>e</sup> larve s'est changée en—

"No. 5. Pseudo-chrysalide ou Pseudo-nymph(è) ayant l'apparence d'une puppe de diptère, avec six petits mamelons à la place des jambes. Cette Pseudo-chrysalide est immobile et blanche; elle exsude de temps en temps de son corps des petites gouttelettes d'une liqueur hyaline. Elle reste neuf mois ainsi sans changement. Le 15 Avril j'ai vu apparaître—

"No. 6. Une nouvelle larve blanche très semblable au No. 4, mais sans ongles et sans mâchoires cornées. Cette larve s'agite lentement dans sa loge souterraine pendant 15 jours, et puis elle se change en—

"No. 7. Nymph véritable ayant la forme des nymphes ordinaires chez les Coléoptères, avec tous les membres visibles mais emmaillotés. Ses segments abdominaux sont garnis de poils épineux.

"Après un repos de 15 jours cette nymphe a rejeté une dernière pellicule; le pigment s'est coloré en vert, et l'insecte parfait a fait son apparition le 23 Mai. Je l'ai encore vivant aujourd'hui et mangeant des feuilles de frêne.

"Il y a 20 ans que je cours après ce résultat. Vous pourriez communiquer de ma part cette nouvelle découverte à nos collègues. Je crois que c'est la première Cantharide élevée artificiellement."

\* "Mémoire sur l'Hypermétamorphose et les mœurs des Meloïdes," par M. Fabre, Ann. Sc. Nat., 4e Série (Zoologie), tome vii, 1857.

*Note.*—This communication is accompanied with rough sketches of some of these stages, showing that the second and subsequent larval forms still retain effective legs, whereas they are described as “purely vestigiary” in *Sitaris*.\* The habits of this particular *Ceratina* have yet to be explained, as this genus of bees is accustomed to nidificate in briars, which would not seem to admit of the *Cantharis* larva quitting its domicile to burrow underground for its ultimate transformations.

Mr. Meldola communicated the following translation of a paper by Dr. Fritz Müller, † published in ‘Kosmos,’ May, 1879, p. 100 :—

“*Ituna and Thyridia; a remarkable case of Mimicry in Butterflies.*” ‡

“The genera *Ituna* and *Methona* were erected by Doubleday in 1847, and placed between *Eutresis* and *Thyridia* in the family Heliconidæ, from which they were subsequently removed, with *Ithomia* and its allied genera, and transferred to the Danaidæ. *Methona* has since been united with *Thyridia*, Hübn., next to which genus *Ituna* still stands in Kirby’s ‘Synonymic Catalogue’ (1871). These two genera appear, therefore, to have been always regarded, and are still recognised, as closely allied. Their resemblance, however, is not due to consanguinity, but has been acquired through imitation, and is remarkable, inasmuch as the insects have not only deceived casual collectors, but even skilled observers, after careful comparison. The resemblance of the genera named is the more worthy of notice since it occurs between insects both belonging to the group of butterflies which are protected by distastefulness. The explanation which applies in ordinary cases of mimicry—and no other has, so far as I know, been offered—cannot obtain for this imitation among protected species.

“*Ituna, Ilione and Thyridia Megisto*, the wings of which are here represented (Figs. 1 and 2), are with us two rather rare butterflies. In addition to the similarity of the wings, which is to be found in the arrangement of the transparent yellowish spots and of the black veins and bands which intersect and divide these spots, and also in that of the white spots which ornament the black wing-borders, may be added the long yellow antennæ and the black and white marking of the body in both species. Both butterflies

\* Fabre, *loc. cit.*, p. 335. Valéry Mayet, Ann. Soc. Ent. de France, Sér. 5, tome 5, 1875, p. 86.

† [I am indebted to Mr. Charles Darwin for drawing my attention to this paper, and to Dr. Ernst Krause, of Berlin, one of the Editors of ‘Kosmos,’ for permission to reproduce it in our ‘Proceedings,’ as also for having kindly placed at my disposal electrotypes of the wood-cuts.—R. M.]

‡ “This paper, as also that on *Epicalia Acontius* (‘Kosmos,’ iv., p. 285) was in our hands before the appearance of Wallace’s paper on the colours of plants and animals, which explains why the author has not taken Mr. Wallace’s later views into consideration.”—*Note by the Editor of ‘Kosmos.’*

show, like the *Ithomiæ*, a preference for the small white flowers of an *Adenostemma*, which grows on the borders of woods and on the edges of forest-paths; but they also visit other flowers, especially white ones, of the same order (Compositæ), such as *Vernonia*, *Mikania* and *Baccharis*. I do not remember to have seen them on flowers of other orders.

“The characters by which Doubleday separated the genus *Ituna* from the apparently similar *Methona* and *Thyridia* are such as would not prevent these genera from being regarded as most closely related, and the differences to which I am about to refer may appear very insignificant; they become of importance, however, from the fact that they recur in long series of allied species, one group of which agrees with *Ituna* and the other with *Thyridia*; it thus appears that the Danaïdæ long ago underwent separation into two groups, one being related to *Ituna* and the other to *Thyridia*, so that these two genera must have undergone a correspondingly ancient separation.

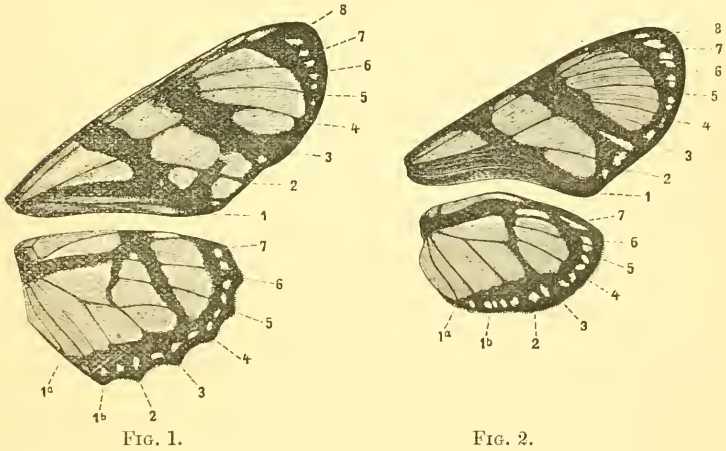


FIG. 1. Wings of *Ituna Ilione*, ♂

FIG. 2. Wings of *Thyridia Megisto*, ♂

} Under side.

The wing-veins are numbered according to Herrich-Schäffer's system.

“In the next place, on the hind wings in both sexes, between two of the veins, there are always two white spots situated between the nervures *1 b* and *2* (*i. e.*, between the submedian and first branch of the median), but in *Thyridia* these spots are double. The wing-cell between these two nervures appears double, as indeed it is. Originally, as shown by moths and the pupæ of butterflies, the wings of butterflies had three veins on the inner margin, the foremost of which (*1 c*) has disappeared, although sometimes to be found in a rudimentary condition. Thus, in *Acraea Thalia*, for example, the course of this vein on the hind wing is indicated by a row of

black hairs similar to those marking the courses of the other well-developed nervures. In many other cases there is scarcely anything of the missing vein (1c) to be seen, but its former existence is indicated by the markings of the wings, which make the cell between the veins 1b and 2 appear double. In other cases this indication of the original state is also lost, and the cell which was formerly double shows the same number of spots as the others. The wing-cell in question, as in *Thyridia*, still appears double in *Dircenna*, *Ceratinia*, *Mechanitis*, *Melinæa*, and in all the allies of the Ithomiæ; on the other hand it is single in *Lycorea* and *Danaïs*, as in *Ituna* (and also, judging from figures, in *Hestia* and *Euplaea*).

“A second distinguishing character between the genera *Ituna* and *Thyridia* consists in the presence of a small ‘basal cell’ (*Wurzelzelle*), as Herrich-Schäffer calls it, at the base of the hind-wing in *Ituna*, and also in *Lycorea* and *Danaïs*, but which is wanting, on the other hand, in *Thyridia* and in all the allies of the Ithomiæ. Herrich-Schäffer made use of the ‘basal cell,’ where he found it, as a family character. Thus, by its absence or presence, he distinguishes between the families Heliconidæ and Danaidæ, which latter he limited to the genus *Danaïs*; if he had not therefore overlooked the certainly very small ‘basal cell’ in *Ituna* and *Lycorea*, he would have separated these genera from the Ithomiæ and have associated them with *Danaïs*.

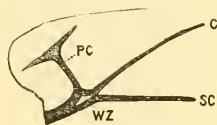


FIG. 3.



FIG. 4.

Basal portion of the hind-wings of *Ituna Ilione* (Fig. 3) and *Thyridia Megisto*, ♂ (Fig. 4).

PC, precostal; C, costal; SC, subcostal veins; WZ, basal cell.

“In the next place, in the production of odour, the male *Thyridia* allies itself to the Ithomiæ, *Ituna* to *Lycorea* and *Danaïs*. The males of *Ithomia* and its allies are known to possess an odoriferous ‘tuft of hair on the upper side of the hind-wing on the subcostal vein’ (Herrich-Schäffer), and this character served that author for distinguishing the genus. In *Thyridia Megisto* the odour of this tuft is very powerful, and it is the only species known to me in which the character acquired by the male has been transferred to the female; in the latter it is certainly much less developed and emits a weaker odour. In *Ituna* this tuft is wanting on the hind-wings: on the other hand, as shown by Doubleday, the males have two finger-shaped processes at the end of the abdomen, which can be protruded and withdrawn at pleasure. They carry a tuft of stiff black hairs, which can be spread out like a round brush, and emit what appears to me to be a strong repugnant

smell of snuff. These scent-brushes at the end of the finger-shaped processes are similarly found in *Lycorea*, and also (although less developed and smelling weaker) in *Danais Gilippus* and *D. Eriippus*, in which species they appear to have been hitherto overlooked.

“Thus, on the ground of the foregoing characteristic differences, and especially of the former, which, being obviously of no advantage to the species, may be taken as sure indications of a common origin, the Ithomiæ and the true Danaïdæ (*Danais*, *Lycorea* and *Ituta*—*Hestia* and *Euplœa*, I know only from figures) must be regarded as two groups which long ago underwent separation, and which are at least as far apart as, perhaps, the Acraeinæ and the Maracuja butterflies. These last groups are also distinguished by the wing-cell between the veins 1*b* and 2 of the hind-wing, which is double in the Acraeinæ as in the Ithomiæ, and single in the Maracuja group as in the Danaïdæ. The caterpillars of Acraeinæ accord completely in character with those of the Maracuja butterflies, but not with those of the Danaïdæ and Ithomiæ; the former so well known as living on Asclepiadaceæ have on the back two (*Danais Eriippus*), three (*D. Gilippus*), or four (*Euplœa Midamus*) pairs of long, thread-like, unprotrusible ‘tentacles.’ The *Ithomia* caterpillars, which feed on Solanaceæ or the nearly-allied Scrophulariaceæ, are either entirely without appendages or have below the spiracles fleshy spherical protuberances (*Mechanitis Lysimnia*).\*

“If, in accordance with all characters, *Thyridia* is thus related to *Ithomia*, and *Ituna* to the Danaïdes (if the latter is not, as in Kirby’s ‘Catalogue,’ separated from *Lycorea* by the Ithomian genus *Athesis*), the resemblance of these two genera could only be ascribed to descent from a common ancestor if they had preserved the original colouring and marking of the ancestors of all the Ithomiæ and Danaïdæ. But this cannot be maintained. If the progenitors of these two groups had possessed wings with large transparent spaces, it is improbable that such a large number of the existing species of the said groups should have reverted to a still earlier type of wing completely clothed with scales. It might be maintained, with equal right, that *Lycorea* and the various Ithomiæ, so similar to this genus in marking and colouring, indicate the original marking and colouring of the groups in question.

“A case of *acquired* resemblance—one of imitation or mimicry—is thus presented. But which of the two species, *Ituna Ilione* or *Thyridia Megisto*, is the original form, and which the mimic? On this point there should surely be no doubt. Does not a species which serves as a model occur

\* The caterpillar represented by Boisduval (Spec. Gén. Lépidopt., pl. 4, fig. 9), ascribed to *Stalactis (Nerias) Euterpe*, appears to be that of a *Mechanitis*; in hairiness it resembles that of *M. Lysimnia*. A glance at this figure and figs. 10 and 11 of the same plate, which represent caterpillars of true Danaïdæ, shows immediately the great difference between the caterpillars of the Danaïdæ and Ithomiæ.

always in countless swarms, while the mimic is a hundred times more rare? Does not the model bear the hereditary colouring of its genus and family, while the mimic appears in borrowed plumes? And, finally, is not the model unpalatable on account of its repulsive taste and odour, being for these reasons safe from foes, while the mimic finds protection in its disguise, without which it would be devoured as a tasty morsel? It is much to be regretted, however, that all these characters sometimes leave us in the lurch.

“The imitating species may, at least in some districts, be more common than its model. If both the latter and its mimic extended into a new district the conditions might be more frequently unfavourable to the model and favourable to the rarer species, and thus the original proportional numbers might be reversed; indeed, this may happen, in course of time, in the old habitat of the species. In the province of Santa Catharina, *Archonias (Eutерpe) Tereas* is common in the forest-paths almost throughout the entire year, while its model, *Papilio Nephelion*, is, on the other hand, a rare butterfly. Occasionally the relative numbers of different species change very considerably in successive years, and may be entirely reversed in comparatively adjacent districts. Here in Itajahy *Colanis Julia* is far commoner than the deceptively similar but smaller *Eueides Aliphera*; some months ago, however, to the north of our province on the high land at Sao Bento, I found *Eueides Aliphera* in such numbers that I sometimes caught eight with a single sweep of the net, whilst in the course of a week I saw *Colanis Julia* but two or three times.\* Indeed, it is conceivable that the model species may become extinct while the mimicking species remains unaffected. Thus, according to Mr. Trimen and Mr. A. G. Butler,† *Papilio Antimachus* and *P. Zalmoxis* might be imitations of gigantic extinct or still unknown species of *Acræa*. In the case of the *Ituna* and *Thyridia*, under consideration, both species are rare, at least in Santa Catharina, and their relative numbers give no clue, therefore, as to which is the model.

“The second indication, viz., that the model species bears its own characters, and the mimic acquired ones is found with ease and safety in the fact that the more widely-separated the groups to which the two species belong the further does the imitating species depart from the ordinary characters of its allies. Thus, if certain locusts (*Scaphura*) are disguised as wasps (*Pepsis*)—if others (*Phylloscyrtus*) are disguised as beetles, while others again are disguised as spiders‡—there cannot be the least doubt, in such

\* [See also Trans. Ent. Soc., 1877, p. 223.—R. M.]

† Raphael Meldola, “Entomological Notes bearing on Evolution,” Ann. Mag. Nat. Hist., Feb. 1858, p. 157.

‡ I have never seen this disguise mentioned; I observed it on one occasion. An insect, which I at first took to be a spider, but which nevertheless had a strange appearance, was resting on a leaf; I looked at it on all sides without being clear as to what it was until it jumped up and flew away. The most remarkable feature in it was the long spider-like legs.



cases, which is the imitating species, as the object of the disguise is immediately apparent.\*

“With many other species, also, which are less widely separated such characters are of great service. Thus the black *Archonias Tereus*, with the white spots on the margin of the fore-wings and the rose-red of the hind-wings, presents a strange appearance among its congeners, whilst *Papilio Nephalion* belongs to a long series of similarly coloured species, so that where this *Papilio* is rare and the *Archonias* common, we cannot for this reason regard the latter as the model of the former.

“The more closely related are the two species which resemble one another, the more alike were they *ab initio*, and the more uncertain in consequence is this second indication of mimicry; it becomes perfectly useless in cases where the nearest allies of the two species are without a common, peculiar, sharply defined form of marking and colouring. *Colanis Julia* and *Eueides Aliphera* will again serve as examples. In the genus *Colanis*, near the fiery-red *Julia*, there stands the green *Dido*, and other species with still different colours and form of wing, whilst in the genus *Eueides*, the spotted *Isabella* and the *Acraea*-like *Pavana* stand near the fiery-red *Aliphera*.

“Of the two genera under consideration, *Thyridia* possesses a rather larger number of similar allies (*Dircenna*, for instance) than does *Ithoua*, and we might perhaps consider the latter to be the imitating species since, with respect to flowers, it appears to possess the taste of the *Ithomiæ*, and not that of the blood-related *Danaïdæ*.

“With regard to the third and last indication of mimicry, *viz.*, that the model is protected from enemies by unpleasant taste and odour, whilst the imitator is without such protection, and thus derives benefit from its resemblance to the distasteful model, it is to be remarked that model and mimic could be distinguished from one another with certainty if all distasteful species possessed for insectivorous birds, as well as for us, a repulsive odour, and if also butterflies malodorous to us did not occur as mimics.

“The *Ithomiæ* of the Amazons and their allies (e. g., *Mechanitis*), as Bates observed, are imitated by so many butterflies belonging to the most different families that they may certainly be correctly regarded as quite safe

\* And yet this seemingly impossible misconception has occurred to a German Professor. Prof. Vitus Graber, in his recent interesting book, ‘Die Insekten,’ which is rich in new facts and ideas (but which certainly misrepresents foreign species and much else), speaks (vol. ii. 1, p. 72) of “certain sand-wasps which, in order the more readily to deceive their prey, the genus of crickets, *Sphacura*, disguise themselves in the form of their victims.” The “genus of crickets, *Sphacura*,” must certainly be the locust genus, *Scaphura*. The author has distorted the name as well as the fact. Wasps do not resemble locusts, but the latter mimic wasps, which certainly carry in locusts (but not in the perfect state) for their young, and never *Scaphura*, as far as I have seen. Their deceptive resemblance to wasps serves them as a protection.

from the pursuit of birds on account of their distastefulness and yet, so far as I know, a repulsive smell has not yet been detected in them.\* The odour emitted by the odoriferous tufts of the males is generally very faint and far from being unpleasant, but is rather like that of vanilla or roses, so that the cause of the distastefulness cannot be sought therein, the less so since it emanates from the wings, which are not eaten. We have thus numerous imitators taking for models species without any distastefulness recognizable by us.

“On the other hand, among the numerous mimics which appear<sup>rel</sup> (Itajahy) suddenly in swarms twice in the year are *Acraea Thalia* and the much rarer *Eueides Pavana*, which possesses the same odour-emitting appendages at the extremity of the abdomen and the same repulsive smell as the remainder of the Maracuja butterflies. Of the same nature is the resemblance of the three related and similarly smelling species, *Eueides Aliphera*, *Colanis Julia*, and *Dione Juno*, of which the odoriferous power is certainly possessed in the highest degree by the smallest species, although this appears to have been acquired, in most part at least, subsequently. Further, the strongly smelling *Eueides Isabella* and *Heliconius Eucrate* have either individually or together acquired a resemblance to *Mechanitis Lysimnia*, which (apart from the extremely faint, and to us scarcely perceptible, odour of the male) is to us inodorous; and, among the numerous butterflies which sufficiently resemble the three above-named species as to be occasionally mistaken for them are species belonging to the *Ithomia* group (*Melinæa*) and to the true Danaides (*Lycorea*).

“*Thyridia* and *Ituna* both belong to the class of cases in which the two species which resemble one another appear to be equally well protected by distastefulness. The former belongs to the *Ithomia* group, the distastefulness of which has been just referred to, and the latter to the Danaides, which play the same part as models of imitating species in the Old World as the *Ithomiæ* in the New. They appear even after death to defy the ravages of time and the attacks of mites, &c., by virtue of their distastefulness. Last year Mr. Raphael Meldola exhibited to

\* [The fact that no odour has been detected cannot be considered as conclusive evidence that none is emitted. Just in the same manner as there are sounds and colours both above and below the limits of our sensual perceptions, so there may be odours inappreciable by our sense of smell.—R. M.]

On what authority does Prof. Delbœuf state ('Kosmos,' vol. ii., p. 106) that “the Heliconiæ (the subject treated of referred to *Ithomia*, not to *Heliconius*) when in danger emit a disgusting fluid, which makes them the most distasteful of all food”? It probably proceeded from the pen of one of the numerous followers of Bates and Wallace, who so easily tread the path laboriously beaten out by these unsurpassed observers of mimicry and protective resemblance. [Here follows a severe criticism of Mr. A. W. Bennett's objections to the explanation of mimicry by natural selection; vide 'Nature,' vol. iii., p. 30.]

the Entomological Society the remains of an old Indian collection which had been destroyed by mites, &c., 'the surviving specimens all belonged to protected genera (*Euplaea*, *Danaüs* and *Papilio*), proving that the quality which rendered these insects distasteful was, to a certain extent, retained after death.\*

"Now what does the mimicry of protected species signify? What advantage can it be to the rare *Eueides Pavana* to be so wonderfully like the common *Acræa Thalia*, and what benefit can one species derive from resembling another, if each is protected by distastefulness. Obviously, none at all if insectivorous birds, lizards, &c., have acquired by inheritance a knowledge of the species which are tasteful or distasteful to them—if an unconscious intelligence tells them what they can safely devour and what they must avoid. But if each single bird has to learn this distinction by experience, a certain number of distasteful butterflies must also fall victims to the inexperience of the young enemies. Now if two distasteful species are sufficiently alike to be mistaken for one another, the experience acquired at the expense of one of them will likewise benefit the other; both species together will only have to contribute the same number of victims which each of them would have to furnish if they were different. If both species are equally common, then both will derive the same benefit from their resemblance—each will save half the number of victims which it has to furnish to the inexperience of its foes. But if one species is commoner than the other, then the benefit is unequally divided, and the proportional advantage for each of the two species which arises from their resemblance is *as the square* of their relative numbers.† For instance, let us suppose that in a given region during one summer 1200 butterflies of a distasteful species have to be destroyed before it becomes recognised as such, and that in this region there exist 2000 individuals of one (A) and 10,000 of another (B) distasteful species. If they are quite different each species

\* 'Nature,' vol. xvi., p. 155. 'Kosmos,' i., p. 442. [Proc. Ent. Soc. 1877, p. xii.]

+ Let  $a_1$  and  $a_2$  be the numbers of two distasteful species of butterflies in some definite district during one summer, and let  $n$  be the number of individuals of a distinct species which are destroyed in the course of a summer before its distastefulness is generally known. If both species are totally dissimilar, then each loses  $n$  individuals. If, however, they are undistinguishably similar, then the first loses  $\frac{a_1 n}{a_1 + a_2}$ , and the second  $\frac{a_2 n}{a_1 + a_2}$ . The absolute gain by resemblance is therefore for the first species  $n - \frac{a_1 n}{a_1 + a_2} = \frac{a_2 n}{a_1 + a_2}$ ; and in a similar manner for the second,  $\frac{a_1 n}{a_1 + a_2}$ . This absolute gain, compared with the occurrence of the species, gives for the first,  $1_1 = \frac{a_2 n}{a_1 (a_1 + a_2)}$ , and for the second species,  $1_2 = \frac{a_1 n}{a_2 (a_1 + a_2)}$ , whence follows the proportion,  $1_1 : 1_2 = a_2^2 : a_1^2$ .

will lose 1200 individuals; but if they are deceptively alike, then this loss will be divided among them in proportion to their numbers, the first (A) will lose 200, and the second (B) 1000. The former (A) accordingly gains 1000 (or 50 per cent.) of the total loss, and the latter (B) only 200 (or 2 per cent.) of this number. Thus, whilst the relative number of the two species is in the ratio 1 : 5 the advantage derived by those possessing the resemblance is 25 : 1.

“If two species are concerned, of which the one is very common and the other very rare, then the advantage falls almost entirely on the rarer species. If, for example, *Acræa Thalia* were a thousand times commoner than *Eueides Pavana*, the latter would derive a million times greater benefit from the resemblance of the two species, whilst for the *Acræa* the benefit is practically *nil*. Thus *Eueides Pavana* might by natural selection be converted into one of the most exact mimics of *Acræa Thalia*, although it is just as distasteful as the species imitated.

“On the other hand, if two or even several distasteful species are about equally common, resemblance brings them a nearly equal advantage, and each step which the other takes in this direction is preserved by natural selection—they would always meet each other numerically so that finally one would not be able to say which of them has served as the model for the others. In this manner are explained those cases where several allied distasteful species (e. g., *Colænis Julia*, *Eueides Aliphera*, and *Dione Juno*) resemble one another—cases where such resemblance cannot be regarded as inherited, and yet where neither of the species appears to claim to have served as a model for the others.

“To this category *Ituna* and *Thyridia* may belong, although the first has probably made the greater step in passing from the former dissimilarity to the present resemblance of the two species.”

With reference to Dr. Fritz Müller's remarks on the inexperience of young birds, Mr. Jenner Weir stated that from the numerous experiments which he had made on the subject of larvæ which are eaten or rejected, he had always been profoundly impressed with the utter disregard paid by birds to larvæ which were inedible. He had never but once seen a distasteful larva even examined by a bird. When, day by day, he had thrown into his aviary various larvæ, those which were edible were eaten immediately; those which were inedible were no more noticed than if a pebble had been thrown before the birds. It was Mr. Weir's opinion that the experience of birds in this respect had become hereditary in the species, and was not the result of the experience of individual birds, but was rather to be regarded as an act of “unconscious cerebration.”

Mr. Bates, whilst acknowledging the great value of the numerous facts adduced from his own personal observation by Dr. Fritz Müller, could not agree with him in his proposal to separate, as a distinct family, *Ituna* and

*Lycorea* (with *Danaïs*) from *Thyridia* and the remainder of the *Ithomia* group; the characters mentioned by him only went to prove that *Ituna* and *Lycorea* were the connecting links between *Danaïs* and the *Ithomiæ*, thus justifying the views of those Lepidopterists who first defined this important group nearly twenty years ago. With regard to the still incompletely solved problem of mimicry, he could not see that Dr. Müller's explanations and calculations cleared up all the difficulties. The numerous cases where species which are themselves apparently protected by their offensive secretions evidently mimic other species similarly protected still form a great stumbling-block. The excessive complexity of the question must be evident to all who read Dr. Fritz Müller's writings on this subject. The phenomena with regard to the *Heliconidæ*, stated broadly, were these:—In Tropical South America a numerous series of gaily-coloured butterflies and moths, of very different families, which occur in abundance in almost every locality a naturalist may visit, are found all to change their hues and markings together, as if by the touch of an enchanter's wand, at every few hundred miles, the distances being shorter near the eastern slopes of the Andes than nearer the Atlantic. So close is the accord of some half dozen species (of widely different genera) in each change that he (Mr. Bates) had seen them in large collections classed and named respectively as one species. Such a phenomenon was calculated to excite the interest of the travelling naturalist in the highest degree. Although the accordant changes were generally complete, cases occurred in which intermediate varieties were still extant, and the study of these had given him, when he was in South America, the clue to an explanation which, however, does not embrace the whole of the problem.

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July 2, 1879.

Sir JOHN LUBBOCK, Bart., M.P., V.-P.R.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

*Election of a Member.*

Mr. Vincent Robert Perkins, of 54, Gloucester Street, South Belgravia, was balloted for and elected an ordinary Member.

*Exhibitions, &c.*

Mr. S. Stevens exhibited living specimens of *Tillus unifasciatus* and *Teretrios picipes*, from the same fence, at Norwood, where these insects were captured last year, this being the fourth season of capturing the first, and the third season of taking the second species in this locality. (See also Proc. Ent. Soc., 1878, p. xli).

Mr. M<sup>r</sup>Lachlan made a further communication respecting the sculptured pebbles from Lac Léman. He had received from Prof. Forel an actual water-worn limestone pebble from the lake, which did not, however, show any distinct sculpturing, but on it were the covered channels formed by Trichopterous larvæ. A number of the perfect insects forwarded (with larvæ and pupæ) by Prof. Forel proved to be *Tinodes lurida*, Curt., a common insect generally on the margins of lakes and rivers.

Mr. W. L. Distant exhibited a specimen of *Papilio Hystaspes*, Feld., taken by Mr. R. E. Cole at sea during a calm, thirty miles from Singapore and nine miles from the nearest land. This butterfly, found both at the Philippine Islands and Malacca, is generally considered as a variety or local race of *Papilio Helenus*, Linn., round which are also grouped a number of other closely allied forms. Mr. Distant suggested that if, as in this case, one of these forms could be found so far at sea during a calm, it could easily be realized how in such a region of sudden storms involuntary migration must frequently take place, and the differences in the conditions of the new habitats might be sufficient to produce the many constant but varietal forms of this species.

Mr. William Cole exhibited a remarkable variety of *Pyrameis cardui*, taken at Buckhurst Hill, Essex, in June.

The Secretary exhibited, on the part of Lord Walsingham, some specimens of a species of Tipulidæ (*Bittacomorpha clavipes*, Fabr.), remarkable for possessing greatly enlarged tarsal joints, captured at Pitt River, California.

Sir Sidney Saunders communicated the following additional explanation, received from M. Jules Lichtenstein, of Montpellier, respecting the rearing of the blister-beetle, *Cantharis vesicatoria*:—

“(1). L'espèce de *Ceratina* qui m'a servi à l'élevage, est la grande *C. chalcites* de Germar = *egregia* de Gerstäker. Elle niche dans les tiges sèches de sureau (*Sambucus ebulus*, L.).

“(2). La larve qui succède à la pseudo-nymphé (*a*) rejette complètement la peau de la pseudo-nymphé (*b*); ce qui la distingue des '*Sitaris*' et '*Zonitis*,' qui gardent la peau de pseudo-nymphé (*c*) complètement, et de '*Meloë*,' qui la garde à moitié. Vous avez parfaitement raison dans votre appréciation de cet état. C'est une phase de la transformation de la pseudo-nymphé (*d*)\* en vraie nymphé.

“Je vous réponds de suite pour que vous puissiez donner ces renseignements à nos collègues de 2 Juillet.”

*Note*.—M. Lichtenstein further explains, in a communication to the Académie des Sciences ('Comptes Rendus,' No. 21, 19 Mai, 1879), that the *Ceratina* is not the ordinary victim of the *Cantharis*, which, he suggests, is probably usually reared in the cells of bees burrowing in the ground, such as the *Halicti*, *Andrenæ*, &c., stating also the means which he adopted

\* (*a, b, c, d*) "Pseudo-chrysalide," Fabre.

for availing himself of the stored cells of the *Ceratina* for this purpose, the "Scarabéoïde" larva having been transferred to a glass tube containing about four inches of moist earth, wherein it immediately buried itself, constructing a cell against the side of the tube, and thus facilitating his subsequent observations.

August 6, 1879.

J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

*Exhibitions, &c.*

Mr. Phillips exhibited living specimens of both sexes of *Spercheus emarginatus*, taken at West Ham.

Mr. Stainton exhibited, on behalf of Mr. Grigg, of Bristol, larvæ of *Rüslerstammia Erælebella*, a genus of which the larvæ had hitherto been unknown. These were obtained from lime trees near Bristol, feeding externally on the leaves, quite exposed. They were very transparent, showing the whole of the interior of the larvæ, and with the segments deeply incised. When full-fed they turned down the edge of the leaf and spun the cocoon within the fold thus made, just like the larvæ of the genus *Orniæ*.

Miss Ormerod read a paper entitled "Sugar-cane Borers of British Guiana," and exhibited specimens of the insects referred to in different stages of development. The first—a moth stated to be a *Proceras* (sp.?)—was the most destructive, and the other insects were Coleopterous belonging to the genus *Calandra*—*C. sacchari* and *C. palmarum*. Miss Ormerod made the exhibition on behalf of the Colonial Company, who were anxious to receive any information as to available and practical methods of dealing with these attacks.

Mr. W. L. Distant stated that these insects had long been recorded as destructive to the sugar-cane in the West Indies, and that the circumstances were almost the same on the plantations in the Straits Settlements at Malacca, where the usual remedy, and possibly the only one, was searching for and burning the infested canes, thus gradually diminishing, and possibly eventually to a great extent extirpating, these destructive insects.

Mr. Swinton contributed the following note:—

"At page xii. of the 'Proceedings of the Entomological Society of London' for 1877, contained in the third issue for that year, I find the following observations recorded:—'Mr. Meldola stated that . . . the larva of *Liparis auriflua*, which feeds upon hawthorn, sloe, apple, oak, &c., and which possesses the well-known property of "urticating," could be adduced as an example of a larva feeding on non-poisonous plants, and yet elaborating

poisons by chemico-physiological processes.' Mr. M'Lachlan remarked that the received opinion, on the other hand, was that 'the urticating property was due to mechanical irritation, the numerous brittle hairs of the larva entering the skin.' Mr. Dunning and Mr. Waterhouse raised the question whether the hairs thus penetrating the skin might not possess some poisonous quality.

"On the penultimate and ante-penultimate segments of the Gold-tail Moth, *Liparis auriflua*, will be seen dorsally two scarlet conical and truncated tubercles, which superiorly present a keyhole-shaped orifice. These when the caterpillar contracts its tubercles, which it does in the fashion of a sea anemone, enlarge by the constriction to a triangular shape, and a colourless liquid wells up to their rim. A pencil-point dipped in this chalice and applied to the cheek or eyelid will at once renew the said burning sensation, and leave little doubt as regards the caustic property of the fluid. The larva then in this instance poisons its lances, and if a magnifying power be applied, the drops of moisture conglobing on the hairy armature are revealed to view, squirted from the hinder craters, by constriction we may presume, since touch immediately produces a contraction in the hinder segments of the caterpillar."

The following communication was received from Mr. R. M'Lachlan:—

*"Correlation of Mutilation in the Larva with Deformity in the Imago.*

"In the 'Comptes Rendus,' of the Belgian Entomological Society meeting of the 5th July (1879), is a notice by M. Mélise on this subject, and of more than ordinary interest. M. Mélise operated upon ten selected silkworms by cutting off the right metathoracic leg of each of them. All went through their transformations, and the operation caused, apparently, little inconvenience, for they recommenced feeding almost immediately afterwards. The effect on the moths produced from these larvæ was as follows:—One was deprived of three tarsal joints, but the claw was developed. Three were deprived of three tarsal joints, and of the claw also. Three had only the femur and tibia. One had the leg 'amputated' in the middle of the femur. The two others had only a stump, scarcely a millimètre in length. M. Mélise adds that in not one of the moths was the leg absolutely absent, and that the variation in the amount of deformity probably resulted from the difficulty of performing the amputation in the larvæ at precisely the same place in each. In the case of insects with incomplete metamorphoses parallel experiments have often been made, and with similar results: but with Lepidoptera they have been so few as to render confirmatory evidence of the statements of other experimenters of much value."

*New Part of 'Transactions.'*

Part II. of the 'Transactions' for 1879 was on the table.



*Sugar-cane Borers of British Guiana.* By E. A. ORMEROD, F.M.S.

[Read August 5, 1879.]

THE insects now exhibited are specimens, in various stages, of the so-called "Sugar-cane Borers," which have recently been doing great harm to the crops in British Guiana. The sugar-canes, some of which when received, contained the larvæ still alive, and some of the specimens in spirit, are forwarded by Mr. D'Urban, of Exeter; the others are the property of the Colonial Company, who have large interests in that colony and the adjacent West Indian Islands, and whose plantations have been suffering severely from attack. The specimens are exhibited to-night by desire of the Company, who would be much gratified to receive any information as to available practical methods of dealing with these attacks, and also for information as to the species of the moth, which is one of the most injurious of the three insects causing the damage.

This moth is stated to be a *Proceras*, but, as far as I can see, it differs in the imago state from the *Proceras sacchariphagus* (which appeared as a destructive visitation in Mauritius in 1856) in not having black spots on the borders of the wings, and the larvæ also have larger spots than those figured and accompanying the excellent paper given by Professor Westwood on the subject in the 'Gardener's Chronicle' (July, 1856), and differ in other particulars as to habits. I have had careful search made in the collections at the British Museum; but no similar moth has, I am informed, yet been found there.

Speaking on behalf of the Colonial Society, we should feel greatly obliged if any lepidopterist would be kind enough to give the correct name, either to myself or to the Secretary of the Colonial Society, 16, Leadenhall Street. This moth is stated, from observations taken on the Leonora Plantation, Demerara, and also on the Berbice Estates, to lay its eggs on the tender inner leaf of the cane; these soon hatch, and the grub sustains itself on the soft tissues till its jaws are sufficiently strong to enable it to penetrate into the heart of the cane itself, where it drives galleries, principally upwards, fifteen, eighteen, or more inches in length, several of these galleries being found in one cane. The entrance hole is stated to be thoroughly closed by *excreta*, which serve as a protection against the ants, and the larva is said to be remarkably active, letting itself down on removal from its burrow by a thread some inches long, up which it returns with facility, and also making much use in locomotion of its caudal extremity. The pupa is not mentioned, excepting a single note of the empty husk being found in the gallery, and mention of a larva being noticed (also inside a cane just at the point of pupal change), differing from the *Proceras*

*sacchariphagus*, which is described as making a silken cocoon amongst the cane-leaves, and a single chrysalis of a moth was found in a living state in one of the young cane-shoots among Mr. D'Urban's specimens.

This moth causes injury by attacking the young canes, and the treatment applied is to cut back the cane below the surface of the ground, covering the plant with mould and adding a handful of lime. The amount of injury is the cost of cutting the canes, and throwing back the crop a month or more, and also the damage both to the quantity and quality of the juice from the tainted larval gallery. This injury, however, is said by one of the chief planters in the Demerara district to be as nothing compared with the effects of the *Calandra sacchari*, the orange-brown weevil, about half-an-inch long, with darker streaks on the thorax and elytra, of which specimens, together with the larvæ and pupal cocoons, are now shown, corresponding with the description of this weevil given by Gyllenhal (Schoenk., Gen. et Spec. Curcul., iv., p. 891), from a specimen from St. Vincent. The history of this weevil has been given by the Rev. L. Guilding with that of the *Calandra palmarum* in the 'Transactions of the Society of Arts.'

The larva of this beetle is said in the notes now received to riddle the heart of the matured canes to an incredible extent, destroying a large portion of the substance so as to leave only the outside rind, without, however, absolutely killing the leaves at the head of the cane, so that in cutting away suspected plants many escape notice. On opening a fair-looking cane, the contents would be found to be a mass of decayed and decaying matter, the greater part having been converted into *excreta* resembling sawdust, with the pupal cocoons lying in the mass, these cocoons being formed by the *Calandra sacchari* grub twisting the fibre of the cane round and round till it makes a kind of winding-sheet enveloping it during the pupal changes. Quoting from Mr. D'Urban's letter, he says, "The weevil-grubs . . . . have the power of turning themselves round and round, and so making a sort of cocoon by rolling themselves up in the fibre of the cane." Various stages of development are found in one cane. The perfect weevil is described as running with great swiftness as well as flying to an immense distance, and is attracted at once and in great numbers by the exposure of putrid cane or cabbage-palm. The injury caused by this weevil is very serious, not only from the destruction of the cane, but also, notwithstanding the care used to remove suspected specimens, some escape notice from the insect presence not always showing externally; and the result from their decayed contents is a discoloured, sticky, and very disagreeably smelling syrup, instead of the clear yellow juice usually delivered by the rollers.

The third enemy, the great black cane-weevil, known in its larval state as the "groo-groo worm," eaten by the natives, and now exhibited, with its

magnificent cocoons, is stated to be much less destructive than the other two borers, and is considered to follow them. Mr. Everard Im-Thurm, the Curator of the British Guiana Museum, George Town, writes me, "The moth and the small weevil attack the canes first; the former the young canes, the latter the older canes; and if I am not mistaken it is only after these two have weakened the canes that the *C. palmarum* enters, and finally destroys the whole inside of the stem."

Other "borers" may exist, but these are the chief ones, and have been causing serious damage, their especial presence in this season conjecturally arising from, or being ascribed to, the use of strong chemical manures, and the long droughts and hot weather which have, as one of their effects, in great part driven from the fields the enormous multitudes of ants which are in ordinary seasons attracted by the dew in the hollow between the cane-leaf and its stem, and carry off the eggs and young larvæ of the borers. It has been well suggested by one of the chief planters in Demerara that as drought appears to be the cause of the trouble it would be well to join together and arrange the methods of irrigation, so as to keep the canals and small drains supplied, and thus guard against the natural enemies of the borers being driven away. Experiments were also being tried as to the efficacy of steeping suspected cane-cuttings in water for forty-eight hours. This, it was considered by the manager of the plantation on which it was being tried, killed the larva without injuring the cane, and the obvious remedies of destroying cane-rubbish, and the larvæ, as far as they could be reached, were also being practised. A circular has also been addressed to the planters requesting information, the points required being carefully specified, and also giving these suggestions.

On being applied to by the Colonial Company, and by Mr. Walker, late Assistant Secretary and Lieutenant-Governor of the Colony, on the subject, I suggested—instead of using water as a steep, which possibly would only temporarily stupify the grubs—that the mixture mentioned at p. 13 of the 'Second Annual Report of the Queensland Board' might be found serviceable. This consists of common carbolic acid and water (the proper strength not yet decided, but 1 lb. of acid to 100 gallons of water recommended). This mixture, under the name of "phænique," is used (the proportion not given) in the Mauritius, the canes being steeped in it for ten to twelve hours, and it is stated to be an infallible remedy for the "Poa blane" of that island; in Queensland Dr. Bancroft mentions steeping the canes for twenty-four hours without injury to the plant. Looking to the apparent attraction by scent, and also to the fact that the young canes were a special subject of attack, and to the known powers of spirit of tar as a deterrent, I suggested that this might be mixed with earth or ashes and used as a dressing, or "soluble phenyle"—which I have been experimenting very much with and found very useful

in these matters of insect deterrence—might be used with ashes, or possibly be worth experimenting with dilute as a steep.

I also suggested, besides, the manifest means of destroying all rubbish containing or attracting *Calandra*, or larvæ generally, that some pits of water with a few putrid canes in them, such as are described as at once bringing them on exposure, might serve as traps on a large scale, with only the expense of a boy to watch and destroy the weevils as they accumulated. The beetles appear easy of attraction, and in the case of our English *Calandra*, I have trapped them by myriads in this way. As some fear was expressed by one of the managers that in destroying the infested canes they would do harm by also destroying the ants on the plant, I suggested that probably this amount of loss would be quite immaterial, and that it was of the greatest importance to destroy the borer larvæ wherever attainable; but it appears to me that destruction should be by burning, not simply crushing, as—so far as I understand the operation—the eggs and smaller larvæ would be very likely to escape.

Other points have, of course, been entered on; but, as far as I am able, I have endeavoured to give those that appear of most importance, and any suggestions that may be kindly offered will be most gratefully received.

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September 3, 1879.

J. JENNER WEIR, F.L.S., F.Z.S., Treasurer, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

*Exhibitions, &c.*

Mr. Philip B. Mason exhibited specimens of *Harpalus oblongiusculus*, Dej., taken in August, 1879, at Portland. One specimen had been captured there last year by Mr. Harris; but at least a score had now been taken in this locality, thus confirming the claim of this species to a place in the British list. Mr. Mason also exhibited, on behalf of Mr. Gameys, of Repton, specimens of *Euplectus ambiguus*, Reich., showing the difference between this and the var. "*duplo minor*" described by Thomson. The variety exhibited, which has not been before recorded in Great Britain, was taken at Repton in flood refuse during the late spring.

Miss E. A. Ormerod read the following:—

*“Notes on the Prevention of Cane-borers.”*

“The specimens I have now the pleasure of showing are forwarded by Mr. D’Urban, of Exeter, as examples of the injury caused by the so-called

'cane-borers' (in this case the *Calandra palmarum*) to the sugar-canes of Demerara.

"One piece shows the commencement of the attack, 'the preparatory holes made for it to insert its eggs' (as stated in observations from the colony); the second shows the complete destruction of the inside fibre of the cane, and in the third piece the cane is completely hollowed out.

"These specimens were accompanied by two living larvæ of the cane-weevil, which formed their cocoons whilst on the way, and which it will be noticed have availed themselves for the purpose, of the packing material; the inside of the cocoon which I have opened being, as usual, of fine cane-fibres, but the outside consisting, in one case almost entirely and in the other partially, of the straw or grass (still with a few empty ears on it) in which the cane was packed. The difference in material is rather interesting, as it gives means of tracing the method of plaiting and arranging longitudinally as well as merely twisting the fibres. The pupa was found to be dead shortly after the specimens were placed in my hands, and is now shown with the cocoon from which I removed it.

"A single specimen of lepidopterous pupa was also sent over, lying in the central gallery it had hollowed in a small cane-shoot little more than a quarter of an inch in diameter. This pupa was singularly active when I received it, moving at will for about an inch along its gallery; but though placed in an evenly warm and moderately damp atmosphere, and left undisturbed, excepting occasional examination for certainty that all was in order, I fear it is dead.

"May I be permitted now to mention that after the last meeting I communicated the results of the discussion on the borers to the Secretary of the Colonial Company, who expressed his thanks for the attention that had been kindly given to the subject, as well as his hopes of further valuable information from Mr. Distant and others of our Members. Such suggestions as were then made he was about to forward to the colony, and at the same time he stated he would direct specimens of the lepidopterous borers in proper condition to be sent for examination.

"I have since received copies of reports from Mr. Im-Thurn, the Curator of the British Guiana Museum, in George Town, giving some information in addition to what was then sent. This consists chiefly of further details of the working of the *Proceras* (or what are conjectured to be *Proceras*) larvæ on piercing into the canes; a short note of the quality of the cane-tops cleared in cutting out grubs being sufficiently good for the products to pay all expenses, which is a very material point in a remedy; a sketch of the injury done by the various borers; and also, what I wish most particularly to call attention to, as it seems possibly to account for the unusual amount of attack of all the species of borers at once. I gather from a few words that the practice of burning off the remains of the standing

crop of canes on the field has been introduced during the last five years, and there are notes also of the presence of borers in fields which have been burnt off whilst in another locality close by, where this treatment was not applied, the canes thrive, borers were absent, and ants were present in myriads.

“I will now give some of these notes from the documents sent over; and first as to the working of the *Proceras* larva from the Uitologt plantation, the writer says:—

“I have omitted to remark that the first-mentioned borer (the *Proceras* larva) weaves no cocoon about itself before it enters its second state; but about it can be found a very fine silken web, almost invisible to the naked eye, and that it does not eat out much of the heart of the cane, but that when it goes into the cane it eats round the joint (the place where its first hole into the cane is almost always to be found) in such a way that the circulation of the sap of the plant is interrupted, after which the top of the cane (or whole of the part of it above this hole) decays, and finally falls off, while the part of the cane under the hole of the insect, or between the hole and the ground, throws out shoots from every eye, and the plant is ruined. The first indication of this borer being present is when the centre leaves of the plant begin to turn white; but any one searching for the animal in a cane stool that has already turned that colour will invariably be disappointed, find the mischief to the plant done, and the insect gone. It generally attacks the best working cane of a stool, a good healthy cane being, as a rule, softer than one partially stunted, and consequently more easily bored into.’

“The report of the Managers of the Great Diamond Plantation gives some good notes, in few words, of the general characteristic of the attacks of the three chief cane-borers:—

“1st. The lepidopterous larva (presumably of the *Proceras*) has only been found hitherto in growing canes and above ground.

“2ndly. The larva of the *Calandra palmarum* is found in rotten canes; cane tops after they are old, though still growing; and in the stools below ground. The cocoons in which these insects lie in the chrysalis state are nearly always to be found at the extremity of the cane top deepest in the ground.

“3rdly. The larva of the *Calandra sacchari*, which is distinguishable from the *C. palmarum* by its smaller size and colouring of dark brown and yellow ochre, instead of black, but similar in habits, and in forming an intricate and strong cocoon woven of fibre to protect it whilst in the pupal state.’

“With regard to the cutting out of infested cane, and the value in product paying expenses, it is noted:—

“Besides the burning alluded to previously, a gang of men has been employed cutting out such young canes as show signs of the attack of the

insects, and these have been thrown into canals and sunk under water. A good many insects are killed in this way, but a great many escape. In dry weather it might be preferable to make them into heaps on the downs, and, after being allowed to dry a little, covered with dry trash or grass and burnt. This cutting out was commenced some six weeks ago; and during that time 246 acres have been gone over, and although experience is so short, it may be safely said that the young cane-stumps look stronger than they have done for a long time past, although they have had very dry weather on them lately. Fifty punt loads of tops and water-sprouts, which had shown signs of the attacks of the borers, have been brought home and ground, and the juice showing a density of  $1042\frac{1}{2}$ , after being neutralized by lime, was set up and distilled. Sufficient rum and megass were obtained to pay all expenses.'

“The note which follows, with regard to amount of ant presence, is very important:—

“Ants are of very great service, and it is satisfactory to notice that they are on the increase. These devour the insects when in the chrysalis state. It is thought that the continuous droughts have had more to do with the scarcity of ants than anything else, and with two consecutive wet seasons, no doubt they will be almost as numerous as ever; but at the same time it is thought that for many years past they have not been seen in such quantities as formerly, which, however, may be put down to the fields being burnt off for five consecutive years.'

“This view is strongly confirmed by the account of some experiments carried on at the Rose Hall Plantation on 100 acres of cane:—

“On week ending the 3rd of May a twenty-acre field of canes was set fire to and cut down, after all the canes had been sent to mill; the rubbish from the field was also thoroughly cleared. Two twenty-acre fields adjoining were also in turn burnt and cut down; and two other fields near were next reaped after the canes had been ground. On the three fields which were burnt on the ground the spring of cane in the first was weak and unhealthy, ants few, and canes attacked by *Proceras*; on the second and third the spring was good, but ants similarly not numerous and canes attacked by *Proceras*; whilst the fourth and fifth fields in which the cane was reaped threw up healthy shoots, “an army of ants” appeared on every bed, and there were no signs of any stool having been attacked by any of the borers.'

“The writer from this draws a very correct conclusion:—

“It is evident that to burn fields in which the small red or black ants are to be found in abundance is a mistake, as large numbers of the best friends of the canes must inevitably be destroyed by the fire. To entice ants and other insects known to be antagonistic to grub-life is of vital importance, and no trouble should be spared in getting them into the cane-fields.'

“From these notes it appears to me that a process of certain destruction to the natural enemies of the borers has in some cases been going on, by which the ants and their nests are swept off the fields together. In cultivation spreading over great areas, as in sugar-cane culture, it is the natural balance that must chiefly be looked to for protection. Clearing off infested canes by every available means is most important, whether by cutting off, grubbing up, or any other means, and utterly destroying these infested pieces, including amongst them rotten cane thrown aside, which is notably attractive to *Calandra*. But though no way is so thorough as destruction by fire for the perfect clearance of these infested canes, they should not on any account whatever be burnt on the surface of the fields. A few straggling ants burnt on the heaps are of no account; but if the remains of the standing crop are burnt in the fields, so as to spread the fire over the surface, or in any other situation whatever where the fire can destroy the ants' nests, it is a loss by each nest destroyed of so much skilled protection to the cane crop.”

Mr. M'Lachlan stated that the lepidopterous larva proving so destructive was probably no other than that of the moth noticed by Fabricius in 1794 as “*Phalena saccharalis*,” and which had been commonly noticed since his time in various West Indian and South American plantations. He agreed with Miss Ormerod that the only probable means of lessening the amount of damage was to be sought in the practice of uprooting and burning all infested canes the moment they showed signs of the presence of the larva; not by burning them on the ground, but by collecting them and destroying them by fire outside the plantations, by which means the risk of destroying the natural enemies of the borer would be avoided. From the accounts just read it appeared probable that the *Calandra* only came in after the canes had been rendered unhealthy, or were destroyed, by the larva of the moth, and thus acted the part of scavengers, completing the work commenced by the moth.

Mr. Jenner Weir exhibited a pair, male and female, of *Cicada montana*, taken in the New Forest, in July, 1879.

*Paper read.*

M. Ch. Oberthur communicated the following paper:—“Observations sur les Lépidoptères des îles Sangir et descriptions de quelques espèces nouvelles.” Coloured drawings of some of the new species described were exhibited.

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October 1, 1879.

Sir JOHN LUBBOCK, Bart., M.P., V.-P.R.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

The President alluded to the loss which the Society had sustained by the death of Mr. William Wilson Saunders, F.R.S., who had been President in 1841, 1856 and 1857.

The President then announced that Lord Walsingham, in conjunction with other gentlemen, had placed at the disposal of the Council the sum of £100, to be awarded in two prizes of £50 each for the following subjects:—

1. The best and most complete life-history of *Sclerostoma syngamus*, Dies., supposed to produce the so-called "gapes" in poultry, game, and other birds.

2. The best and most complete life-history of *Strongylus pergracilis*, Cob., supposed to produce the "grouse disease."

No life-history would be considered satisfactory unless the different stages of development were observed and recorded. The competition was open to naturalists of all nationalities. The same observer might compete for both prizes. Essays in English, German, or French were to be sent to the Secretary of the Society on or before October 15th, 1882.

Mr. McLachlan said that, with the greatest respect for the liberal offer made to the Society by Lord Walsingham, he nevertheless considered the Council had not held sufficiently in view the objects for which the Society was instituted when they entertained his offer. The Society was now (as almost always) languishing for want of funds sufficient to enable it to efficiently carry out its purpose—the advancement of entomological science; and he thought that if this were properly brought under the notice of Lord Walsingham he might be willing to modify his offer so as to bring it within the scope of the aims of the Society. By accepting the offer as it stood he thought the Council had exposed the Society to the risk of ridicule. The subject belonged more properly to the Linnean or Zoological Societies. It was true that the subjects in which the Society was specially interested did not consist exclusively of Insects, but they were limited to that division of the Animal Kingdom classed under the comprehensive term Arthropoda, and in no case could the Entozoa come within that division.

Mr. Stainton remarked that when he heard an announcement made from the chair, in which the Latin names of the species occurred, he fully expected that, for the information of the younger members who were present, the President would have stated to what order of insects they belonged. If the creatures in question were not insects, he could not

conceive what the Entomological Society had to do with them. Insects, Crustacea, Arachnida, and Acari came properly under the charge of the Society, but the Entozoa were quite foreign to its scope, and fell more strictly within the province of the Linnean or Zoological Societies, with which latter Society he believed Lord Walsingham to be connected. It was a case he considered of *ultra vires*, and when he used that expression he was in hopes that he should induce a lawyer whom he saw present to rise and say a few words on that text.

Sir John Lubbock stated that the offer for these prize essays had first been made to him by Lord Walsingham, and, as President of the Society, he did not take upon himself to refuse what appeared to him a valuable opportunity of extending the knowledge of an obscure group of Annulosa, but had forwarded the letter to the Secretary, to be laid before the Council, by whom the offer had been accepted. He fully agreed with Mr. M'Lachlan and Mr. Stainton that these Entozoic parasites could in no way be regarded as coming within the scope of Entomology proper; but he was of opinion that in accepting Lord Walsingham's offer a useful precedent was established for receiving future support from others who might be disposed to extend similar aid to the investigation of subjects coming more strictly within the province of the Society. In conclusion, the President stated that the Council were in the hands of the Society, if any member chose to put the objections raised to the acceptance of the offer in question into the form of a resolution.

Mr. Stainton said that he had no intention of moving any resolution on the subject. He thought the Council was the proper body to deliberate on the matter; but if a suggestion were made to Lord Walsingham that the development of Entozoa was a subject which came very properly in the province of the Zoological or Linnean Societies, but that to the Entomological Society the matter was altogether foreign, his lordship would be found quite ready to transfer his proposal to one of those Societies.

Mr. Pascoe observed that the subject was one which should be settled entirely by the Council.

Mr. C. O. Waterhouse remarked that in accepting this offer the Council could not be considered to have claimed for the Society any special knowledge of the subjects proposed for competition; they were simply placed in the position of having to award a certain sum placed at their disposal for essays, the quality of which they would be at liberty to refer for determination to any competent authority, whether in the Society or not. If the prizes had been offered by the Council, or to members of the Society only, there would have been good grounds for objecting to their acceptance, but as the competition was open to any person, whether a member of the Society or otherwise, the Council were only the means of communication between Lord Walsingham and the essayists, to which no objection could be raised.

*Election of a Member.*

Mr. Philip Henry Gosse, F.R.S., of Torquay, Devonshire, was balloted for, and elected an Ordinary Member.

*Exhibitions, &c.*

Mr. M'Lachlan exhibited specimens of an Hemipterous insect just received from a gentleman residing near Canterbury, and which, it was stated, was causing great damage to hops, being known to the growers as the "needle-nosed flea." It was stated that hitherto it had only appeared in a restricted area, but this year it occurred over many acres. The insect proved to be *Anthocoris nemorum*, and Mr. M'Lachlan suggested that it was on the hops in search of Aphides or other small insects, its habits being carnivorous, so far as is known. Hence the hop-growers were possibly asking advice as to the destruction of what might be one of their best friends.

Mr. M'Lachlan also exhibited examples of the larvæ of one of the *Embiidæ*, found by Mr. Wood-Mason at Jubbulpore on his return to Calcutta, crawling on the ground in the open, and also occurring under loose bricks; the latter habit being quite in accordance with that most generally attributed to the family, although one species (*Oligotoma Michaeli*, M'Lach.) had been found in a hot-house near London, in all its stages, and apparently injuring orchids. The species sent by Mr. Wood-Mason was probably *Oligotoma Saundersi*, Westwood.

Mr. M'Lachlan further called attention to the sculptured stones on the shores of Lake Léman, alluded to at two previous meetings (*vide* Proc. pp. xviii and xxx), and which it had been suggested by Prof. Forel might be merely due to the action of Trichopterous larvæ, apparently those of *Tinodes wæneri* (*larida*, Curtis). Mr. M'Lachlan had recently examined multitudes of these stones on the shores of Lake Neuchâtel, and under peculiarly favourable conditions, because recent engineering works had lowered the level of the lake, and exposed many interesting phenomena. The stones, which (as in those of Lake Léman) were limestone, were very strongly sculptured, but in differing degrees, so as to lead one to suppose that all might not have been acted upon by the same agents, or that differences in the texture of the stone occasioned variety in the sculpturing. He was doubtful as to the ability of any Trichopterous larvæ to occasion the sculpturing, and thought it more probably the result of the work of Mollusca, but there still remained much uncertainty as to its exact nature.

Mr. Waterhouse, with reference to injury done to hops, stated that he had recently inspected a hop garden in Sussex, in which great mischief had been done by a species of Homopteron (*Euacanthus interruptus*), probably assisted by an Hemipteron (*Lygus*). These punctured the leaves in which holes were afterwards formed, so that the surface was destroyed,

and the supply of nourishment to the plants thus prevented. He was of opinion that *Euacanthus* was likely to have been the cause of the damage complained of by Mr. M'Lachlan's correspondent.

Mr. Pascoe exhibited an apparently new genus and species of *Acridiidæ*, remarkable for its aquatic habits. It was seen in some numbers hopping about on the surface of a pool near Pará.

The Rev. A. E. Eaton exhibited larvæ, pupæ, and cases of *Hydroptila* (restricted) collected near Val d'Illiéry, Vallais, and Sixt, Haute Savoie. The larvæ at first roam at large, caseless; when they become corpulent they construct oval-cylindrical cases of fine mud. They abound on rocks suffused with an extremely thin film of water resulting from the spray and dribbling of trickling streamlets, especially in places exposed to the sun. Mr. Eaton had found other undescribed species on the Rhine, in the Cantal and in the Pyrenees. The only named species was described by Schneider from Messina in 'Stet. Ent. Zeit.' (vi., p. 346, 1845), and was referred with a query to *Phrixocoma* by Eaton in 'Trans. Ent. Soc.,' 1873 (p. 137, pl. ii., fig. 2), under the supposition of its having 0.2.4 spines; but it is actually a normal *Hydroptila* with 1.3.4 spines.

Sir John Lubbock exhibited a specimen of *Orchesella rufescens*, taken in Kent, being a species of *Collembola* new to Britain.

Mr. E. Boscher exhibited a coloured drawing showing the extreme forms of two varieties of the caterpillar of *Smerinthus ocellatus*, found feeding respectively on *Salix viminalis* (osier) and *S. triandra* (French willow). When the subject of the coloration of caterpillars was brought before the Society last year (Proc. Ent. Soc., 1878, pp. iv—vii), several cases of dimorphic *Sphinx* larvæ had been mentioned; but, so far as he was aware, the present variety of *S. ocellatus* had not been recorded. The larvæ feeding on *S. viminalis* were remarkable on account of their possessing a double row of brown spots along the side, and were most conspicuous on account of their bright green colour against the dark foliage of the osier, whilst those feeding on *S. triandra* were rather difficult to find, as they assimilated in colour to the leaves of that plant.

Mr. Wood-Mason communicated the following note:—

"The specimens of *Narycius* (*Cyphonocephalus*) *smaragdulus*, figured on pl. i., fig. 3 ♂, fig. 4 ♀, of 'Trans. Ent. Soc.,' 1878, were obtained by Mr. W. Davison at Vythrey, Wynaad, Southern India. A specimen of the male has been received during my absence from Col. R. C. Beddome, who obtained it on the slopes of the Nilgiris, Ootacamund."

#### *Papers read, &c.*

Mr. J. S. Baly communicated a paper containing "Descriptions of Phytophagous Coleoptera belonging to the families *Chrysomelidæ* and *Galerucidæ*, from Peru."

Mr. A. G. Butler communicated "Descriptions of two new Lepidoptera of the Family *Sphingidæ*."

Mr. C. O. Waterhouse read "Descriptions of two new Genera and Species of Coleoptera from Madagascar, belonging to the families *Tenebrionidæ* and *Cerambycidæ*."

Mr. Waterhouse also read a paper "On the Affinity of the genus *Polyctenes*, Westwood, with a description of a new species." The genus was originally described by Sig. Giglioli as belonging to the Dipterous family *Nycteribiidæ*. Professor Westwood, in his 'Thesaurus,' differed from this view, and appeared disposed to place it near the Hemiptera. In examining the species now described (*P. lyræ*), Mr. Waterhouse had come to the conclusion that the genus had no connection with the Hemiptera. He exhibited diagrams showing that the structure of the legs and claws and the general characters of the insect were those of the family *Hippoboscidæ*; and his views of this affinity were confirmed by comparison with a new genus of Dipterous insects from Colombia (*Euctenodes mirabilis*, n.s.), which although certainly allied to *Strebla*, was blind, and possessed the same remarkable fringe of spines to the back of the head, and in other points resembled *Polyctenes*.

The Rev. A. E. Eaton suggested affinity with the Anoplura, to which there was some resemblance in the division of the head, but the structure of the legs was different.

In reply to Mr. M'Lachlan, Mr. Waterhouse stated that he had not discovered any halteres in *Polyctenes*.

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November 5, 1879.

H. W. BATES, F.L.S., F.Z.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Mr. Stainton read two letters from Lord Walsingham, setting forth in a more detailed manner the objects which his lordship had in view in offering the prizes referred to at the last meeting through the Council of the Society. These objects were thus explained in the first letter:—"First, to obtain some useful result; but, secondly, having long paid only a small annual subscription to the funds of the Society, I fancied it would be acceptable to them to have at their disposal the means of offering a substantial prize for useful work, which, although not connected with the special province of the Society, was such as many Members of it would probably be extremely competent to undertake. The Linnean and Zoological Societies are rich enough to afford to offer such prizes out of

their own funds, whereas the Entomological Society, of which I have long been a Member, has never been in a position to do so, and I had hoped to make this small contribution to their means of usefulness." His lordship added that if it should be decided by the Society that he was mistaken in supposing that it was of any advantage to them to be able to offer the said prizes, he would be quite willing to give his consent to their being transferred to some other body considered to be more conversant with the proposed subjects. In his second letter, his lordship also stated:—"It would not greatly surprise me if it should be ultimately discovered that insects have something to do with the life-history of *Sclerostoma*. I have found Entozoic parasites other than insects in the larvæ of Lepidoptera, and it is at least a puzzle how the egg of *Sclerostoma* of last September is to produce a living worm in the trachea of a Partridge next August without the good offices of some ready 'medium.'" Mr. Stainton then expressed the high opinion he entertained of the entomological abilities of Lord Walsingham, and stated that he had no doubt whatever that in making this offer to the Society his lordship had been actuated by feelings of pure benevolence. He was still of opinion, however, that Lord Walsingham had been misled by an error of judgment. In further support of the views expressed at the last meeting, Mr. Stainton asked the Members to imagine a parallel case in which a benevolent individual, wishing to further science, had placed at the disposal of the President and Council of the Royal Astronomical Society a certain sum to be awarded for the best essay on the constituent elements of chlorine. According to Mr. Stainton's views, the Council of the Royal Astronomical Society would not be the proper body to undertake the adjudication of such a prize, but the assistance of some Fellow of the Chemical Society would have to be invoked, and the prize would fall to the lot of some Fellow of this latter Society.

Mr. J. Jenner Weir thought there was a much closer connection between Insects and Entozoa than Mr. Stainton imagined, and instanced the case of *Filaria sanguinis-hominis*, an Entozoon which had been proved to infest the mosquito as an intermediate host. A paper on insect parasites would be certainly one which was strictly within the province of the Society, and many of such parasites are not even Arthropoda.

Mr. M'Lachlan said he was quite prepared to hear Lord Walsingham's suggestion that the Entozoa forming the subjects for the proposed Prize Essays might possibly live in an intermediate condition as parasites on the larvæ of insects; but he did not see that if even this were the case the subjects would any the more come within the special province of the Society.

After some remarks by Professor Westwood and Mr. P. Wormald, the Chairman stated that the decision at which the Council had arrived might be considered as final.

*Election of a Member.*

Mr. T. R. Billups, of 4, Swiss Villas, Coplestone Road, Peckham, was balloted for and elected an Ordinary Member.

*Exhibitions, &c.*

Mr. W. C. Boyd exhibited a remarkable variety of *Aspilates citraria*, a specimen of *Cidaria testata* in which the hind-wings were completely absent, and a *Noctua* resembling *Hadena dentina*, but differing from this species in the form of the body, taken at Ilfracombe.

Mr. McLachlan said he was compelled to once more bring the subject of the sculptured stones on the shores of the Swiss lakes before the notice of the Society. Professor Forel, upon seeing the notice of the last meeting in 'Nature,' had written to him, explaining at length the nature of those sculpturings according to his views. His remarks may be concisely rendered as follows:—There are three principal types of markings: (1) Where the stones are covered with chlorophyllous Algæ, serpentine furrows, the work of larvæ of *Tinodes*, occur. (2) Where the stones are covered with incrusting Algæ the markings are more numerous and meandiform, and due, as he considered, to the permanent pathways made amongst the Algæ by insect larvæ, worms, mollusks, &c., intensified by the carbonic acid expired by the animals. (3) Grooves caused by the larvæ of *Chironomus*.

Professor Westwood exhibited a series of drawings illustrating the economy and transformations of several species of Trichopterous and other Neuropterous insects, of which he gave an account; also drawings of a number of new and interesting exotic species of Heteropterous Hemiptera, allied to the genera *Syrtis*, *Emesa*, *Rhyparochromus*, &c., contained in the Hopeian Collection, full descriptions of which he proposed shortly to communicate to the Society for publication.

Prof. Westwood next called the attention of the Members of the Society to the present condition and future prospects of the Hopeian Collection of Entomology in the University of Oxford, and of the Hopeian Professorship of Zoology connected therewith, considering that it was very desirable that, at his advanced age, entomologists should, in the interest of their science, be made fully acquainted with the extent of the Hopeian Collection, the regulations connected with the Professorship, and the modification which has been proposed by the Oxford University Commission, now sitting, which, in his opinion, would materially modify, and to a certain extent render nugatory, the intentions of the founder of the Professorship and donor of the Collection. The Hopeian Collection of insects and other articulated animals is now one of the largest in existence. Besides the original Hopeian Collection, to which that of Prof. Westwood was subsequently added, large additions have been made from time to time. By the

liberality of Mrs. Hope, the Saundersian collection of Orthoptera and Heterocerous Lepidoptera (containing all Mr. Wallace's Malayan species) was purchased, and annual additions are made by purchase with the grant added by Mrs. Hope to the original foundation fund. The collections of the late Mr. Wells, the Rev. Mr. Tylden (especially rich in *Curculionidæ*), the Rev. Mr. Spilsbury, the Saundersian Hymenoptera, large purchases of Mr. Wallace's private collections of Coleoptera from the Malayan Archipelago, the Wollaston collection (with all the dissections prepared by that gentleman), the Marshall collections of Orthoptera and Neuroptera, the Harsey collection from India, the Burchell collections from South Africa and Brazil, the Oates collection from Upper Caffraria, the Bell collection of Crustacea (of singular beauty), the Adams collection of Crustacea from the Eastern Ocean, and many others of smaller importance have been added either by purchase or as donations. For the proper understanding of the Hope Professorship and the duties devoting on the Hope Professor as keeper of this extensive Collection, it has been thought advisable that the Conditions of the Hopeian Deeds of Gift should be published in an Appendix to the present volume, as they appear in the Oxford University Statute Book. This appears to be rendered necessary by the proposal for the future modification of the Professorship which has been made by the Oxford Commissioners in a Statement which has been issued by them in the 'Oxford University Gazette' of the 26th April, 1878, "with respect to the main purposes relative to the University, for which, in their opinion, provision should be made under the Act," and in which, amongst many other proposed alterations, the Commissioners state that "it may be desirable to provide a Reader in Human Anatomy as assistant to the Professor of Human and Comparative Anatomy, with a stipend of from £250 to £300 per annum; and we think there should also be a Reader (at a present stipend of £400 per annum) in Invertebrate Anatomy, *whose office, upon a vacancy in the Professorship of Zoology, should be united to that Chair*, with such an increase in the emoluments of the Professor as may make them equal to those of the Chair of Human and Comparative Anatomy, conditionally on his undertaking the additional duty." Against this proposed alteration Mrs. Hope has sent in a remonstrance to the University authorities, urging that it would completely alter the character of the Hopeian Professorship, and militate against the original clearly defined intentions of the founder, who foresaw that this care of his Collections and additions thereto would be amply sufficient for the entire labours of his Professor. Indeed by the 13th clause of the original deed the Hope Professor was expressly forbidden to hold any other professorship or readership in the University. Up to the present time (November, 1870) the Commissioners have not officially dealt with the question of additional Professorships or Readerships.



Mr. M'Lachlan said that entomologists should be much indebted to Professor Westwood for having brought this subject prominently before the Society. It was much to be desired that the successor to Prof. Westwood in the Hope Professorship should be specially an entomologist, both as carrying out the wish of the founder and as a guarantee that the magnificent collection at Oxford should be well cared for and made available for the purposes for which its former possessor bequeathed it to the University.

Prof. Westwood, with reference to the affinities of the genus *Polyctenes*, Westw. (Thes. Ent. plates 38, 39 and 40), which Mr. C. O. Waterhouse at the last meeting of the Society had regarded as closely allied to the *Nycteri-biidae*, and especially to the genus *Strebla*, remarked that the structure of the mouth in this genus was entirely that of the Heteropterous Hemiptera; the antennæ also agreed with those of the insects of that suborder, and the pair of short alary appendages were similar to those of the common bed-bug (*Cimex lectularius*). Besides which the nature of the transformations of the genus *Polyctenes* had been clearly proved by Prof. Westwood's observations and figures, plate 39, figs. B, C and E, to belong to the section with semi-complete pupæ ("Metam. dimidiata"), and could not possibly be assigned to that section of the "Metamorphosis perfecta" with inactive pupa which had been especially named "pupa coarctata" by Linnæus, consisting of the order Diptera, and to which, as shown by Prof. Westwood (Trans. Zool. Soc., vol. i., pl. 36, figs. 22 to 25), *Nycteribia* is also referable.

Mr. C. O. Waterhouse stated that he was perfectly aware that Professor Westwood's specimen had a claw within a claw as if about to shed its skin; but in his opinion it did not follow that, because about to change, it is an Hemipterous insect. It might develop a two-winged fly resembling the new genus which he had described. Mr. Waterhouse used the expression "two-winged fly" advisedly, because this group may have to be separated from the true Diptera.

Mr. J. Jenner Weir exhibited some ants, apparently a species of *Atta*, which he had found in large numbers at Pisa on the lawn around the Baptistry and Cathedral. These ants did not make any hill of earth about their nests, but collected around the entrance hundreds of small empty shells of *Helix caperata* and *H. virgata*. He was unable to offer any opinion as to the object of these singular collections. The shells were so numerous and lay so closely together that he could easily take them up by scores at a time.

Mr. Weir also exhibited a specimen of an *Orgyia* (? *antiqua*), stated, on the authority of Mr. H. S. B. Gates, to have come out of the larval skin without passing through the pupal state.

The Secretary read the following note from Mr. W. L. Distant:—

“My friend Mr. F. Moore has placed in my hands for determination a few Hemiptera, which he received from India, with the accompanying notes as to their habits, &c.; and as little is known of Indian Economic Entomology, especially as far as the order Hemiptera is concerned, I herewith state the results of my examination.

“Species reported as feeding on the flower-juices of plants of the cucumber tribe:—*Halyo dentata*, Fab.; *Palomena viridissima*, Poda (var.): *Piezoderus rubrofasciatus*, Fab.; *Agonoscelis nubila*, Fab.; *Lygæus militaris*, Fab.; *Graptostethus servus*, Fab.

“*Coptosoma cribraria*, Fab. Reported as very common on Legumines (*Labial. vulgaris*, &c.); the flower-stalks and flowers in many cases swarm with them, and so continuing until they had reduced all to bare stalks.

“*Bagrada picta*, Fab. Reported as affecting the flower-shoots and flowers of the field mustard (*Sinapis dichotoma*), on which plant is also found *Pachymerus sordidus*, Fab.”

The Secretary also exhibited a photograph on behalf of Dr. Fritz Müller, and read the following note:—

“I take the liberty of sending you a photographic copy of some drawings of a very curious dipterous insect. The larva is remarkable for having six segments only, each being provided on the ventral side with a complicated disk, by which it firmly adheres to the rocks of rapids. The first segment of the larva is a cephalothorax, comprising the head, thorax, and first abdominal segment of the pupa. The pupa, which is firmly cemented to the rocks, has its antennæ, wings and legs free, not adherent to the body. The perfect insect is remarkable for the dimorphism of the females. One set of females agrees in the want of mandibulæ and the structure of the oval parts with the males. They are probably honey-sucking. The other set of females are provided with mandibulæ, like the blood-sucking females of *Culex*, *Tabanus*, &c. In the size of the eyes and the structure of the feet the blood-sucking females differ much less from the males than the honey-sucking females do. I have lately sent to the ‘Archivos do Muséu Nacional de Rio de Janeiro’ a description of this insect, accompanied by seven plates, three of which refer to the highly interesting structure of the larva.”

*Paper read.*

Dr. F. Buchanan White communicated Part I. of a “List of the Hemiptera collected in the Amazons by Prof. J. W. H. Trail in the years 1873—1875.” The present paper deals only with the aquatic Hemiptera (*Ploteres* and *Hydrocorisæ*); twenty-three species and one variety are mentioned, out of which eleven are new. In addition to these, eight of the

other species were discovered by Prof. Trail, making nineteen new species out of a total of twenty-three, and showing how unexplored a field is the Hemipterous fauna of the Amazons. Of the species now described the more interesting are *Mesovelia Mulsanti*, the South American representative of the European *M. fuscata*, M. and R. Hitherto the genus has been monotypic. *Martarega* is a new genus of *Notonectidæ* of rather peculiar structure; and *Heterocorixa* is a new subgenus (probably worthy of generic rank) of *Corixa*, but approaching *Sigara* in the asymmetry of the hemelytra.

Mr. Frederick Bates communicated "Descriptions of new Genera and Species of *Tenebrionidæ* from the Island of Madagascar."

Mr. C. O. Waterhouse read "Descriptions of new Coleoptera from East Africa and Madagascar," and exhibited specimens of the new species.

Mr. A. G. Butler communicated a paper "On the Natural Affinities of the Lepidoptera hitherto referred to the Genus *Acronycta* of Authors." From an examination of the characters, chiefly of the larval stage, Mr. Butler proposes to distribute the British Species of this genus as follows:—

Fam. ARCTIIDÆ.

Gen. *Pharetra*, Hüb. *P. rumicis*, *P. auricoma*, and allies.

Fam. LIPARIDÆ.

Gen. *Acronicta*, Ochs. *A. leporina*.

„ *Artomyzsis*, Hüb. *A. aceris*.

Fam. NOTODONTIDÆ.

Gen.? ——— *A. megacephala* and allies.

„ *Triana*, Hüb. *T. psi*, *T. tridens*, and allies.

„ *Hyboma*, Hüb. *H. strigosa*.

Tribe NOCTUITES.

Gen. *Jocheara*, Hüb. *J. alni*.

„ *Mamestra*, Ochs. *M. ligustri*.

In illustration of the foregoing paper, Lord Walsingham had lent for exhibition his collection of preserved larvæ of this genus.

December 3, 1879.

J. W. DUNNING, M.A., F.L.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

The Chairman read out a list of the names of the Officers and Council proposed for election on January 21st, 1880.

*Exhibitions, &c.*

Mr. Howard Vaughan exhibited a series of remarkable varieties of *Lycæna Corydon*, taken at Dover, one specimen, a female, being suffused with blue on the upper side of the left pair of wings only, whilst the right wings were uniformly brown.

Mr. W. L. Distant exhibited a hitherto unrecorded variety of *Danaïs plexippus*, Linn. (commonly known as *D. archippus*), received from Antigua, in which the rufous coloration was quite absent, the ground colour being dull pale testaceous. Although another similar specimen was received, the variety could not be considered as a local form, Antiguan specimens of the species usually being typical.

Mr. T. R. Billups exhibited the following beetles;—*Pseudopsis sulcata* (Box Hill); *Agathidium nigrinum* (Caterham Valley); *Anisotoma grandis* (Box Hill); *Leptinus testaceus* (Burford Bridge); and *Carabus auratus*, taken in the Borough Market.

Mr. C. O. Waterhouse mentioned a remarkable instance of tenacity of life observed by Dr. Percy in a specimen of *Curculio cleonus*, which, after resisting the action of a laurel-bottle, had been immersed for a few minutes in benzene. The insect recovered after this treatment, and was then pinned and again immersed in benzene for twenty minutes. It was found alive and wriggling on the pin the following morning, when it was once more put into benzene, and left immersed during the whole of one night. Even after this last immersion it recovered, and was only finally killed by hot water.

*Papers read, &c.*

The Rev. H. S. Gorham read a paper entitled "Materials for a Revision of the *Lampyridæ*."

Mr. Bates, in connection with the light-emitting power of this family, remarked that certain species of *Longicornis* mimicked Lampyrids with great exactness, the light-giving segments of the latter being perfectly represented in the *Longicornis*, although destitute of phosphorescent power.

Mr. J. W. Slater communicated the following paper:—

“*On certain Minute Characters of Insects, with reference to the Theory of Evolution.*”

“It has been contended, by no less eminent an authority than Dr. Lionel Beale, that though animals belonging to nearly allied species, or even genera, differ but little in the main features of their structure, yet on minute examination of their tissues very striking and characteristic distinctions are brought to light. He instances the difference between the unstriped muscular tissue of the bladder in the common frog and in the tree frog.

“Again, as regards the chemical composition of the corresponding solid matters, secretions, &c., of closely connected species, he contends that very remarkable differences may be observed. Thus, the blistering principle, known as cantharidine, is met with in all the species of *Cantharis* that have been examined, and also in *Meloë*, *Mylabris*, *Ripiphorus*, *Zonitis*, and *Cerocoma*, whilst it has not been observed in the genus *Sitaris*, which also belongs to the same group. On the other hand, a *Coccinella*, and even a spider (*Tegenaria medicinalis*), have been successfully used for blistering.

“To this I would object that the presence or absence of cantharidine in insects seems in most cases to have been decided, not by actual chemical analysis, but by medical experiment, and that when present in small proportions, or when concealed among dense hard tissues, it may have been easily overlooked. This supposition is the more reasonable as all the species which have come into use as sources of cantharidine are very soft in texture.

“A curious fact has lately come to light in the order Hymenoptera. It has been generally supposed that in the whole of the aculeate section of this order the venomous liquid which they secrete and eject through their stings was of an acid nature. That this is the case among the ants is well known. But in the very next family, the *Vespidæ*, an exception occurs. Professor Church, having caused a wasp—species not named—to strike its sting into a piece of turneric paper, saw to his surprise that the poison was rather alkaline than acid in its nature.

“I purposed a re-examination of this question, but from the peculiar character of the season I was only able to capture three common wasps and not a single hornet. On causing the wasps to sting a piece of neutral-grey litmus-paper it was quite evident that the poison was not acid. Neither did it seem alkaline, as the spot produced was of a dull yellowish grey, and soon became undistinguishable. On the other hand, bees of all the species I was able to meet with secrete an acid poison, their sting producing in every case a tiny red spot upon the litmus-paper. We find, then, this peculiarity, that of all the stinging Hymenoptera, as far as we know, the

wasp alone secretes a non-acid poison. This fact surely merits further examination.

“Turning to structural peculiarities among insects, we find facts less favourable to the views of Dr. Beale and to the anti-evolutionist inferences which he evidently draws. Thus, M. J. Künckel, in his lately published researches on the nervous system of the Diptera declares that each family of that order has its nervous system constructed upon a peculiar and invariable plan, and that the number of nervous centres varies gradually from one family to another. M. E. Brandt also shows that whilst the convolutions of the so-called ‘pedunculated bodies of Dujardin’ vary in their development in different species, yet that such variations occur also among different individuals of the same species. No one can doubt, for instance, the common descent of the working bee, the queen, and the drone, yet in the last-mentioned insect these convolutions are much simpler than in the former.

“Being, however, desirous of investigating Dr. Beale’s supposition further, I thought it might be useful to make a comparative examination, in a number of species, of some parts not liable to be modified by adaptive influences. It may seem strange that I should have selected for this purpose parts which have been so often and so unsuccessfully examined as the wing-scales of Lepidoptera. I proceeded, however, in a manner which has probably not been general. From each of the seventy-one species which I examined I took, as a rule, six portions of scales from determinate regions of the wings—*viz.*, from the centre of the fore wings, from the middles of the anterior and exterior margins of the fore wings; from the middle of the posterior margin of the hind wing, from near its root, and from the middle of the hind wing underneath. Special portions were also taken from eye-spots, wherever situate, from the wing-tails of *Papilionidæ*, or from other parts where a structural peculiarity might be expected. For convenience sake all these portions were put up as dry slides, and submitted to a comparative examination with a microscope.

“I may say that I found none of those exceptional differences between any one species and other species in the same genus which would be required to serve as an argument against evolution. The differences between the scales from two distinct species are often less striking than those from the two sexes of one species or from different parts of one individual.

“Whilst the apices of the scales vary to an almost endless extent, and in a manner in which I have hitherto failed to trace any definite principle, there is great regularity in the insertion of the stem of the footstalk. This is either attached to a rounded or pointed extremity of the scale like the stalk of an ordinary leaf, or it is inserted between two projecting lobes or angular appendages which may vary considerably in shape and proportion. The latter style of insertion is found in all the diurnal Lepidoptera which

I have examined, with the exception of *Parnassius Apollo*. Among the nocturnal groups it occurs only among the *Uranidæ* (*Urania riphæus*); in a few scales of *Macroglossa stellatarum* and *M. fuciformis*, and in a few scales of *Plusia gamma* and *Catocala nupta*. It will be at once seen that these exceptional species are to a very great extent diurnal in their habits.

“All the remaining *Sphingidæ* and *Noctuidæ* that I have examined, as well as all the Cuspidates, Geometers, *Bombycidæ*, *Liparidæ*, *Chelonidæ*, *Euchelidæ*, and *Hepialidæ* have their stems attached to a rounded or pointed extremity without any projecting lobes or angles.

“Another uniformity which I have noticed is that, whilst the scales from the upper side of the wings of Lepidoptera are laterally symmetrical, so that a line drawn from the foot-stalk to the most prominent point of the apex divides each scale into two equal and similar halves, the scales from the under surface, and especially of the hind wings, are very frequently unsymmetrical. In certain groups, especially in the *Sphingidæ*, *Chelonidæ*, *Bombycidæ*, and *Noctuidæ*, one side of the scale is convex and the other even concave, so that the resulting figure resembles that of a kidney bean-pod or of a scimitar. In the diurnal Lepidoptera this want of lateral symmetry is less marked.

“In certain cases the scales from eye-spots or from markings of a metallic character are toothless at the apex,—as, *e.g.*, in *Parnassius Apollo* and *Colias Edusa*,—but in the pearl-matter spots of the genus *Argynnis* this is not the case.” \*

Mr. Roland Trimen communicated a paper “On some hitherto undetermined Butterflies inhabiting Southern Africa.”

Mr. P. H. Gosse, F.R.S., communicated a paper “On *Papilio Homerus*, its Ovum and Larva,” of which the following is an abstract:—

The habitat of this rare and magnificent species is limited to the Island of Jamaica, and to restricted regions even there. Thirty-five years ago the author diligently collected the insects of that island (in the parishes of St. Elizabeth and Westmoreland) during a period of nineteen months, but he never met with this butterfly. A few examples have lately found their way to England, and the species has formed the subject of a paper by Mr. D. G. Rutherford (*Ent. Mo. Mag.*, July 1878, p. 28). Many facts of its life-history, however, still remain to be recorded by some observer dwelling in its haunts: and Mr. Gosse fortunately has some friends residing near one of these, who have furnished his own cabinet with specimens, and contributed some interesting notes on the species. The author's correspondents are the Rev. J. Leslie Mais and his two adult sons, who reside

\* The late Mr. T. W. Wonfor has published some observations on the scales of British Lepidoptera, with reference to sexual differences. See the ‘Popular Science Review,’ 1868, p. 343.—ED.

in the parish of St. Ann, near the middle of the northern half of the island. Mr. Mais has furnished a graphic account of his first personal acquaintance with the butterfly. After alluding to a visit, about a year before, from Mr. Carter, a naturalist now residing in Dominica, who showed him the first *P. Homerus* he had ever seen, he thus writes under date of July 21st, 1879:—

“My sons had caught *Homerus* when they were out without me. I longed to see one on the wing, and it was only three weeks ago that I was gratified. One morning, my son being a little behind me, in an open track through the woods, I saw, as I thought, a large leaf falling slowly from a high tree. [This proved to be a specimen of the butterfly, but the writer having no net it was lost.] \* \* \* \* \* Bath (in the parish of St. Thomas, near the east extremity of the island) was believed to be the only habitat of the species. Yet even there Mr. Carter found that nobody had ever seen it, or could recognise it when a correct drawing was exhibited. In ten days he caught twenty specimens within half an hour's walk of his lodging at Bath.”

Mr. Herbert A. Mais supplemented his father's account with some further particulars:—“The insect was first seen by us near Moneague, St. Ann, in July, 1878, and our first capture was in the following September. We have never seen it except near the dense woods, whence it emerges into the open grounds near to feed on the wild sage (various species of *Salvia* and *Lantana*), which plant is plentiful, and *Homerus*, as well as *Pelaus* and other kinds, seems fond of it. We have captured several while sucking the blossoms of the sage, and our first specimen was taken whilst contending with *Pelaus* for possession of these attractive flowers. It flies very low when in search of food, but if at all alarmed soars up above the tops of the highest trees, and disappears in the deepest parts of the woods. One or two have been seen to come down from the high woods, and, alighting on the back of a leaf of some low tree, fold up their wings, and thus have been easily secured.”

“So far as we can ascertain, this magnificent *Papilio* ranges from 900 to 2000 feet above the sea-level, and perhaps even higher. In this district it is far from common. \* \* \* Though it is now a year since we noticed the first specimen, not more than sixteen have been seen, of which we secured seven. It is difficult to obtain an uninjured specimen, for, being so large and conspicuous, they are easily seen, and are pursued by birds. Out of the seven captured only one was quite perfect.”

Mr. Gosse's correspondents subsequently heard that the butterfly was not unknown in the Pedro District, about twelve miles farther west. Mr. H. A. Mais paid a visit thither in August last, and found it in sensibly increased numbers, capturing five in a few days. One of these specimens, when caught, appeared at first so injured as to be worthless; but its captor,



remarking the unusual fulness of the abdomen, thought that it might be a gravid female. It was, however, put aside in a drawer, and forgotten, till the following evening, when it was found that it had laid four eggs of a pale green colour, which remained attached to the extremity of the abdomen. These were removed, and placed in a small box, where on the 17th (the ninth day after capture) only one hatched, the caterpillar being hairy and black, with a white tail. The young larva was tried with different food-plants, but it refused to eat, and was found dead the following morning. While it lived, however, they had made more observations on its appearance, and had specially remarked "its black shining head, with two hairy horns on each side, and a spot of white between them, and another spot on the tail very conspicuous."

The remaining ova and this starved larva were transmitted to Mr. Gosse for more precise observation. They came in a dried state, in which condition they were first examined, and then again after a brief maceration. The specimens were forwarded in alcohol for exhibition. The following is the author's description, made as completely as possible under the circumstances:—

"*Ovum*.—Outline a short ellipse, but since the shell has contracted in the process of drying and taken a longitudinal fold, it was probably a flattened globe when alive. Surface smooth, with a soft, satin-like radiance, suggesting fine granulation, which, however, is not revealed by considerable magnifying power. The contents of the egg have shrunk in drying into a dark green clot, leaving the shell translucent and nearly colourless."

"*Larva*.—Length, as now contracted, 0·1 inch. Form thick and robust. Colour wholly intense black, except the 11th and 12th segments (counting the head as the first), which are cream-white, forming an abruptly defined and conspicuous white transverse band, which reaches from the dorsum quite round to the venter. Head large, not capable of retraction into the thorax, smooth, polished-black. On the prothorax stand two enormous dorsal tubercles, pillar-like, subconical, each crowned by a great globose knob; the whole, but especially the knob, studded with spreading stiff bristles. These tubercles are not perpendicular, but transverso-diagonal in their direction. The meso- and meta-thoracic segments each bear not only a dorsal but also a lateral pair of similar tubercles, only very much smaller. The abdominal segments are studded with stiff bristles, but are not furnished with tubercles until the 11th and 12th, on each of which is the dorsal pair only, similar to those of the metathorax, but wholly white, even to their bristles—in harmony with the ground-colour of these two segments. Under the microscope, the knobs of the tubercles are seen to be only the aggregated bases of the bristles. These are pellucid, rugose, broadly conical at the base, rapidly diminishing by two or three apparent (not real) joints. The extremities of several are seen to be broken

imperfectly (as a stalk of grass breaks), the terminal portion not separated, but fallen at an angle. When viewed by transmitted light the black tubercles assume a sub-pellucid chocolate-brown colour."

The larva described by no means agrees with any form which has hitherto been supposed proper to the genus *Papilio*, but rather suggests one of the great *Saturniadae*, such as *Samia Cecropia*. *Papilio* larvæ with body projections are indeed known in a few groups, but not with columnus crowned with divergent bristles. "The caterpillars of *Papilio*," says Boisduval, "may be distinguished \* \* \* by the projections of their bodies *never being hispid at their extremities*" (Spéc. Gén. des Lépidop., i. 184). Edward Doubleday says, "The larvæ of *P. Hector*, *Polydorus*, &c., \* \* \* have tubercles on each segment disposed in rows; differing from those of *Ornithoptera* in wanting the external sheath for the tentacula, from those of *Thais* in not having the tops of the tubercles hairy" (Gen. Diurn. Lepidop., p. 6). The tubercles described by Mr. Gosse have nothing in common with the soft warts of *Ornithoptera* and *Thais*. Dr. Horsfield arranges (Lep. Mus. E. I. Co., i. 118) all *Papilio* larvæ under three divisions according to their forms, but neither of these has much in common with the one now described.

The author's correspondent, in his slight description of the living larva, mentioned "a spot of white" between the frontal horns, which Mr. Gosse, however, has not been able to detect. He asks, "Is it possible that what he saw was the extruded tip of an osmaterium?"

That *Papilio Homerus* should have a larva of peculiar form is the less surprising if the species "occupies a position in its genus quite unique" (D. G. Rutherford, *loc. cit.*). Its most closely allied species is *P. Andraemon* of Haïti, an insect with which the author is unacquainted. Within his own limited sphere of comparison the nearest approach to *Homerus*, in form of wings and arrangement of colours, appears to him to be the female of *Erechtheus* from the Papuan Archipelago, and then *Pelaus* of Jamaica. But both of these are very remote, and no more is known of their larvæ than of that of *Homerus*.

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## ANNUAL MEETING,

January 21st, 1880.

J. W. DUNNING, M.A., F.L.S., Vice-President, in the chair.

Mr. F. P. Pascoe, one of the Auditors, read an abstract of the Treasurer's Accounts for 1879, showing a balance of about £2 in favour of the Society.

The Secretary read the following:—

## REPORT OF THE COUNCIL FOR 1879.

In accordance with the Bye-Laws the Council presents the following Report:—

During the year 1879 the Society has lost seven members by death and two by resignation; nine Members and Subscribers have been elected, thus leaving our total number exactly the same as last year. Among the losses by death two have already been alluded to from the chair, *viz.*, Mr. William Wilson Saunders and Mr. Frederick Smith. The other deaths are Mr. Thomas Chapman, Mr. John Dawson, Mr. Noah Greening, Mr. Edward Pictet, and Mr. N. C. Tuely.

The Council has once more the satisfaction of being able to announce that the receipts for the year have been sufficient to balance the expenditure, as will be seen from the following abstract of the Treasurer's accounts:—

RECEIPTS.		PAYMENTS.	
Balance in hand	- - - £31	Rent, Office, and Meeting Ex-	
Contributions of Members	- 191	penses	- - - - £124
Sale of Publications	- - 90	Publications	- - - - 217
Interest on Consols	- - 8	Library	- - - - 18
Donations	- - - 41		
	<u>£361</u>		<u>£359</u>

The 'Transactions' for the year (exclusive of the 'Proceedings') form a volume of 346 pages, containing twenty-five memoirs, and illustrated by eleven woodcuts and eleven plates, of which three are coloured. The expenses connected with Plate I., illustrating Messrs. Bates and D. G. Rutherford's paper containing descriptions of new Goliath Beetles, have been defrayed by Mr. F. J. Horniman. The cost of colouring Plate VI has also been defrayed by the author, Prof. Westwood.

The only new feature connected with our publications is to be found in Plate VIII., illustrating M. Ch. Oberthür's description of new butterflies from the Islands of Sangir. In this plate, executed by Messrs. West, Newman & Co., the old and expensive method of hand-colouring has been replaced by chromo-lithography, with a result that is highly satisfactory, both as regards accuracy and reduced cost.

Our Library has received the usual number of periodicals, and Members still continue to make increasing use of the books. Among special donations the Society is indebted to Mr. J. W. Dunning for Doubleday and Hewitson's 'Genera of Diurnal Lepidoptera' and Buckton's Monograph on the Aphides; to Mr. W. H. Edwards for the first volume of his 'Butterflies of North America'; and to Sir John Lubbock for the Rev. Hamlet Clark's 'Catalogue of Halticidæ,' Woodward's 'Catalogue of British Fossil Crustacea,' Spence Bates's 'Catalogue of Amphipodous Crustacea in the British Museum,' and many other works. The Society is likewise indebted to the executors of the late Mr. W. C. Hewitson for a copy of the Catalogue of Diurnal Lepidoptera bequeathed by him to the British Museum.

Although the attendance-book shows a small falling off in the number of members and visitors present at the meetings of the past year as compared with the attendances during 1878, the Council is of opinion that the interest of the meetings held during 1879 has been as well sustained as in former years.

*11, Chandos Street, Cavendish Square, W.*

*January 21st, 1880.*

Mr. J. W. Slater and Mr. T. R. Billups having been nominated Scrutineers, the following Members of Council were elected for 1880:—Henry Walter Bates, F.L.S., F.Z.S.; William Cole; William L. Distant, Direct. Anthrop. Inst.; Joseph W. Dunning, M.A., F.L.S.; F. Du Cane Godman, M.A., F.L.S.; Ferdinand Grut, F.L.S.; Sir John Lubbock, Bart., M.P., F.R.S., &c.; Raphael Meldola, F.R.A.S., F.C.S.; Osbert Salvin, M.A., F.R.S.; Edward Saunders, F.L.S.; H. T. Stainton, F.R.S.; Samuel Stevens, F.L.S.; J. Jenner Weir, F.L.S., F.Z.S.

The following officers were subsequently elected:—President, Sir John Lubbock, Bart., &c.; Treasurer, Edward Saunders; Librarian, Ferdinand Grut; Secretaries, Raphael Meldola and Wm. L. Distant.

The Chairman delivered an Address.

Mr. M'Lachlan proposed and Mr. H. W. Bates seconded that a vote of thanks should be given to Mr. Dunning for his Address, and that the latter should be printed. The motion was put to the meeting and carried unanimously.

Mr. F. P. Pascoe proposed that a special vote of thanks should be given to Mr. Jenner Weir, the retiring Treasurer, for his services to the

Society. Mr. M'Lachlan seconded the proposition, which was carried unanimously.

Mr. Weir replied and proposed a vote of thanks to the Secretaries and Librarian, which was likewise carried unanimously.

Mr. Meldola and Mr. Grut replied.

The Chairman moved and Mr. M'Lachlan seconded a vote of thanks to the President for his past services, which was carried unanimously.

STATEMENT OF RECEIPTS AND PAYMENTS

FROM 1ST JANUARY TO 31ST DECEMBER, 1879.

Receipts.		Payments.	
	£ s. d.		£ s. d.
To Balance at 1 Jan. 1879	- 30 14 7	By Rent, Salary of Sub- Librarian, and Office } Expenses - - - }	124 1 6
Subscriptions - - -	- 156 15 6	Printing - - - -	- 155 1 6
Admission Fees - - -	- 8 8 0	Colouring Plates, &c.	- 61 9 0
Arrears - - - - -	- 9 9 0	Books - - - - -	- 18 3 9
Composition Fee - - -	- 15 15 0		<u>£358 15 9</u>
Donations - - - - -	- 40 18 6	Balance at 1st Jan. 1880	2 11 10
'Transactions,' sale of -	90 12 4		<u>£361 7 7</u>
Consols, interest on £297 9s. 9d. }	8 14 8		
	<u>£361 7 7</u>		

A S S E T S .

	£ s. d.
Balance brought down - - - - -	2 11 10
Subscriptions due, but not paid, considered good (say)	10 10 0
Consols, £297 9s. 9d. - - - - - (cost)	277 9 0
	<u>£290 10 10</u>

J. JENNER WEIR, *Treasurer.*

Audited and found correct, {  
E. BOSCHER.  
W. F. KIRBY.  
J. W. DUNNING.  
FRANCIS P. PASCOE.

14th January, 1880.

## THE CHAIRMAN'S ADDRESS.

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GENTLEMEN,

By the absence of our President the Annual Meeting is shorn of its chief attraction : the cause of that absence can but intensify our regret. Death has removed one of our Vice-Presidents ; and the multiplicity of the engagements of my surviving colleague has prevented him from preparing the Anniversary Address to which I had hoped to listen.

In the Society's infancy a few unpremeditated remarks appear to have been all that was expected on such an occasion. But as increasing years and growing strength gave it position among the scientific bodies of the metropolis, successive occupants of the Chair have availed themselves of this opportunity of vindicating the Society's choice of its temporary head ; and when I recall the Presidential Addresses that have been delivered by him whose place I so unworthily fill, or by such predecessors as Bates and Wallace, Saunders and Westwood, it only remains for me to deplore the combination of circumstances which has provided you with so inefficient a stop-gap. To me Entomology is only a plaything, and my entomological reading, at all times limited, has of late been, by other avocations, reduced to a vanishing point. I have nothing of scientific value to communicate, either original or acquired ; and at once discarding all attempt to instruct, I propose to return to the primitive habit of our earlier days, and confine myself to some discursive observations about ourselves and our own concerns. Even larger and wealthier communities cannot altogether disregard home affairs, and find it necessary to pay some attention to the state of their finances.

The Annual Report of the Council has been read, and has, I trust, been found satisfactory. I invite remarks thereon, for this evening's meeting is the opportunity our constitution affords for

interpellating the Executive. Now is the time for discussing the policy of the Council, criticising its acts or omissions, and requiring explanations of its conduct. It would be a healthy sign if members would exhibit some of the interest they doubtless feel in the management of our affairs, by giving us the benefit of their criticism and their counsel. When for a series of years the Report is accepted without a word of comment or inquiry, a suspicion is begotten that the Society is too acquiescent, and would not even be roused into activity if a Report were altogether wanting.

I regret that we have been unable to retain the services of Mr. Jenner Weir as our Treasurer. Mr. Yarrell filled that post for eighteen, Mr. Stevens for twenty years; but seven years have sufficed for their two successors. Of all our officers the Treasurer is the one who should be least often changed, and I hope the result of this evening's ballot will be the election of a gentleman whom we may regard as a fixture for some years to come.

During the year 1879 our numbers have not increased; we have enlisted nine recruits, but the new comers barely counter-balance our losses.

The death of Mr. NATHANIEL CLISSOLD TUELY, of Wimbledon Park; of Mr. JOHN DAWSON, of Caffon; of M. EDOUARD PICTET, of Geneva; of Mr. THOMAS CHAPMAN, of Glasgow; and of Mr. NOAH GREENING, of Warrington, has deprived us of five colleagues whom we had not often the advantage of seeing in this room. Mr. Greening's collection of British Lepidoptera was unrivalled in the North of England, and the Northern Entomological Society loses in him one of its founders and most energetic supporters. Edouard Pictet, the distinguished son of a more distinguished father, was the possessor of a grand collection of European Lepidoptera, but will be best remembered as an entomologist by his '*Synopsis des Névroptères d'Espagne*,' published in 1865.

Our first, and for some years our only, lady-member was Mrs. HOPE, the wife of the Rev. F. W. HOPE, a name still cherished among us. Having survived her husband for more than seventeen years, Mrs. Hope died on the 27th November last, one of her latest acts having been a protest against a suggested alteration of the founder's scheme in relation to the Hopeian Professorship at Oxford.

For nearly a quarter of a century Mr. ADAM WHITE was one of our members, and a constant attendant at our gatherings in Bond Street and Bedford Row. A native of Edinburgh, he came to London as a lad, and when eighteen years of age was attached to the Zoological Department of the British Museum, where he remained until 1863, when mental incapacity compelled his retirement. He lived in seclusion until the 4th January, 1879, when he died at Glasgow at the age of sixty-two. He was the author of papers on all branches of Entomology; the Royal Society's Catalogue contains the titles of fifty-eight articles written by him between 1839 and 1861; he compiled several of the British Museum Catalogues, and all who five-and-twenty years ago had occasion to consult the national collection will remember his readiness to assist, and the broad Scotch accent with which his words of sound advice were delivered.

But if the Museum was prematurely deprived of a faithful servant in Adam White, it has sustained a still greater loss in Mr. FREDERICK SMITH. Of Yorkshire parents and (though born in London) educated at Leeds, when his school-days were over Frederick Smith was apprenticed to an engraver in Soho Square, who had lodging with him a nephew, William Edward Shuckard. The lads became warm friends, but it was not until several years afterwards that Shuckard, having returned to his native town of Brighton, was led by mere accident to observe the habits of some bees burrowing on the Sussex downs; he obtained a copy of Kirby's '*Monographia Apum Angliæ*,' and from that time his whole energies were devoted to Hymenoptera. The future author of the '*Essay on the Indigenous Fossorial Hymenoptera of Great Britain*' soon won over his friend to the same pursuit, and while still a young man Frederick Smith had become an ardent collector of bees and ants, and a close observer of their habits. He assisted John Curtis in some of the later plates of the '*British Entomology*.' On the death of Mr. Bainbridge, in 1841, he was appointed Curator of the Collections and Library of this Society, and for nine years he was to be found every Monday afternoon at the Society's Rooms in New Bond Street. Having been engaged by Dr. Gray to arrange the Hymenoptera in the British Museum, he was employed upon this work when a vacancy in the Zoological Department was created by the death of Edward Doubleday, in December, 1849. Frederick Smith



was shortly afterwards appointed one of the permanent staff of the Museum, and eventually became Assistant Keeper of the Zoological Department. Abandoning art for science he relinquished engraving as a profession, but he engraved from Westwood's drawings the plates of Wollaston's '*Insecta Maderensia*' (1854); and all the plates which illustrate the British Museum Catalogues of Hymenoptera, and his own papers in the Transactions of this and other Societies, were drawn and engraved by himself. At a meeting of this Society, held on the 3rd April, 1837, Mr. Ingpen read a letter from Mr. Smith, giving an account of the natural history of one of the *Cynipidæ* which inhabits the small flat galls on the underside of oak leaves (Proc. Ent. Soc. 1837, p. xliii.). This, I believe, is the first published of Frederick Smith's observations. On the 2nd September, 1839, he read some Notes on the Habits of British Ants, which, however, were not printed until 1842 (Trans. Ent. Soc. iii. 151). From 1842 to the time of his death his publications were unceasing, and some idea of his activity may be gathered from the fact that the Royal Society's Catalogue of Scientific Papers enumerates no less than a hundred and forty-one prior to the year 1874, many of them monographs of high importance, all of them containing something that was worthy of record. The Hymenoptera, Diptera, and Neuroptera collected in Rodriguez by the Transit of Venus Expedition in 1874-5 were worked out by Mr. Smith, and his account thereof has appeared since his death as part of the extra volume of the Philosophical Transactions devoted to the collections of the Transit Expeditions. His last paper, "Descriptions of New Species of Aculeate Hymenoptera collected by the Rev. Thomas Blackburn in the Sandwich Islands," was posthumously read and published in the Journal of the Linnean Society (Zoology, xiv. 674). To these must be added the works compiled by him for the Trustees of the British Museum, including the Catalogues of British Hymenoptera (with sixteen plates, 1855 and 1858; a second edition of the Andrenidæ and Apidæ in 1876), and the Catalogues of the Hymenopterous Insects of the whole world (seven parts, with thirty-seven plates, 1853 to 1859),\*—works which, under the modest title of catalogues, in addition to the

\* The Trustees have, since Mr. Smith's death, published a volume of 'Descriptions of new species of Hymenoptera in the Collection of the British Museum': but it consists of bare descriptions, and nothing more, and will scarcely increase the author's reputation.

synonymy, contain detailed descriptions of hosts of new species and notes on habits and economy. Elected a member of this Society in 1850, he was one of the most constant in his attendance, and for many years served on the Council; he was President in 1862 and 1863, was repeatedly a Vice-President, and had been re-appointed to that office only a fortnight before his death. All will remember his never-failing readiness to impart his knowledge to others, and whenever he was appealed to on any question respecting our indigenous Hymenoptera he had always something valuable to communicate, not taken second-hand from others, but the result of his own personal observation. It was in the field rather than the study that he was at home, where his power of accurate observation had full play; in his knowledge of our indigenous Hymenoptera and acquaintance with their habits he stood without a rival. His death took place on the 16th February, at the ripe age of seventy-three.

MR. WILLIAM WILSON SAUNDERS was originally an officer in the Engineers, and served for a short time in India; but he soon quitted the army, and returned to England before the formation of this Society, of which he was one of the original members. His first entomological paper, "Notes on the Habits of some Indian Insects," was read on the 7th April, 1834, and is published in the first volume of our Transactions. From that time until 1873 he was unceasing in his attention to our affairs; our volumes contain numerous contributions from his pen; he was President in 1841 and 1842, and again in 1856 and 1857; it was owing to his liberality that the Society was enabled from time to time to offer prizes for essays on various subjects connected with Economic Entomology; and there must be many now present who remember the pleasant excursions to Reigate to which he was wont to invite us, when, after a day's ramble on the Surrey hills, the whole Society was asked to enjoy his hospitality. Nor was it this Society alone that had the benefit of his services; elected a Fellow of the Linnean in 1833, and of the Royal in 1853, he was for twelve years the Treasurer of the former, and for several years a Vice-President of the Horticultural Society. In fine, he was ever ready to devote both his time and his wealth to the furtherance of Natural Science; his munificence enabled collectors to prosecute their researches in foreign lands, and assisted in the publication of their discoveries. As long as fortune favoured

him he was a large-minded and open-handed patron of science—a scientific Mæcenas. The last six years of his life were passed in quiet retirement at Worthing, where he died on the 13th of September last, at the age of seventy years.

In accordance with the terms of our late member's will, Mr. HEWITSON'S Rhopalocera have found a permanent home in the National Museum, and his executors have published a complete catalogue of the collection. For twenty-one years the "Hewitson Collection" is to be retained intact, in the same cabinets, in the same order, and under the same nomenclature as the donor left it; but at the end of that time all restrictions cease, and the interests of Science will alone determine its future destiny. This is the true spirit of liberality: who can foretell what will best answer the requirements of the twentieth century, or even of a generation hence? The dead hand should not press too heavily or too long upon the living. The lesson which Hewitson had to teach was to be learned from a study of his collection more than from his published works:

"Our little systems have their day,  
They have their day, and cease to be."

But now that the Hewitsonian teaching is enshrined in the pages compiled by our colleague, Mr. Kirby, and thereby preserved for all future students, Time the Destroyer is rendered powerless, and our friend's fragile gift constitutes his *monumentum ære perennius*.

FÉLICIEN CHAPUIS, HERMANN LOEW, and CAMILLO RONDANI did not belong to our body. But I may be permitted to express the loss which Science has sustained by the death of the Belgian Coleopterist, whilst the removal of the Parmesan, and the still more celebrated Prussian Dipterologist, leaves Europe almost without an authority on the two-winged Order of insects.

But let us turn from these melancholy records to see what evidence of its vitality the Society has given during the year that has expired.

In the first place I may say that the interest of our monthly meetings has been fairly sustained; the record of our Proceedings shows that many valuable exhibitions have been made, and important subjects discussed or ventilated. In proof of this statement it will be sufficient to refer to the interesting conversations which have arisen from the introduction of such subjects as,

for instance, the stridulating power of the *Mantidæ*, Brazilian Caddis-flies and their cases, flights of locusts and migrations of butterflies, flowers and their unbidden guests, the destruction of insects by flowers, sericulture, the metamorphoses of the blister-beetle, the mimicry of insects by insects, the effects of temperature upon insects and insect-life, the existence of branchiæ in the imago-state of certain Trichoptera, sculptured markings on cretaceous pebbles from the Lake of Geneva supposed to be due to insect agency, sugar-cane borers, the correlation of mutilation in the larva with deformity in the imago, and variations in larvæ of *Smerinthus ocellatus* fed on different species of *Salix*. It has afforded me additional pleasure to observe how many of the subjects have been introduced or elucidated by the remarks of some of our junior members. This is as it should be. The younger the better and more welcome. The least experienced, if he will make use of the powers of observation with which Nature has endowed him, is sure to see something which is new to the oldest among us. There is a fair field and no favour. Those who have learnt the most are the most ready to learn, and glad to extend the right hand of encouragement to every fresh worker in the field.

The volume of Transactions for 1879 extends to three hundred and fifty pages, and (to say nothing of several papers printed at length in the Proceedings) it contains twenty-five memoirs, illustrated by eleven plates and as many woodcuts. The authors are sixteen in number: Messrs. Butler and Charles Waterhouse, four papers each; Messrs. Baly, Distant, and Westwood, two papers each; Miss Ormerod and Messrs. F. Bates, Cameron, Moore, Fritz Müller, Oberthür, Rutherford, Sharp, Trimen, Buchanan White, and Wood-Mason, one paper each. Nine of the memoirs relate to Coleoptera, seven to Lepidoptera, three to Hemiptera, one each to Hymenoptera, Trichoptera, and Diptera, leaving three that do not relate to any one Order in particular. Twenty-two out of the twenty-five are on Exotic, three only on British Entomology. M. Oberthür's paper is published in French; and communication with South Africa is now so rapid that Mr. Trimen's paper, which was read at our last meeting on the 3rd December, was published and distributed before the end of the month. For the most part the memoirs, though interspersed with valuable remarks on classification,

variation, affinities, and distribution, must be considered as belonging to the branch of Descriptive Entomology. Of the papers on subjects of more general interest, I may be permitted to allude to Miss Ormerod's "Observations on the Effect of Low Temperature on Larvæ," to Prof. Wood-Mason's "Morphological Notes bearing on the Origin of Insects," to Prof. Westwood's paper "On some unusual Monstrous Insects," to Mr. Charles Waterhouse's paper "On the Affinity of the Genus *Polycetenes*," and to Mr. Butler's paper "On the Natural Affinities of the Lepidoptera hitherto referred to the Genus *Acronycta*." Miss Ormerod's observations confirm the view generally held by entomologists, though it is scarcely the popular opinion, that cold has little or no destructive effect upon larvæ, or indeed upon insect-life in any form; but I do not recall any place where the results of observation are stated with precision of detail, and our member has done well to record the effect of ascertained temperatures upon determined species. The monstrosities mentioned by Prof. Westwood are three butterflies with extra wings or portions of wings, and numerous cases of Coleoptera, Lepidoptera, and Diptera with imperfectly-developed heads, in which the imago retained some portion of the outer covering of the larva or pupa.\* Mr. Charles Waterhouse introduces us to a wondrous creature, *Euctenodes*, which he provisionally places in the family *Polycetenidæ*, and considers allied to the *Hippoboscidæ*, whilst Prof. Westwood seems to doubt whether the group should not be referred to the Hemiptera-Heteroptera.† But Mr. Butler's paper on *Acronycta* is the most startling, and to a lepidopterist of the ancient type its author must appear a perfect revolutionary. Only last year he excited some little astonishment by promulgating the view that the *Ægeriidæ* have nothing to do with the Sphinges, and that their affinities are with the *Pyralidina* and *Gelechiidæ*. I have not heard of any attempt to combat this view, and its opponents

\* The specimen of *Bombyx mori* mentioned by Professor Westwood on p. 223 was bred by Dr. Wallace (Proc. Ent. Soc. 1871, p. iv.) The specimen of *Vanessa Atalanta* mentioned on the same page was bred by Mr. Jackson (Proc. Ent. Soc. 1871, p. ii.) The specimen of *Botys fuscalis* mentioned on p. 227 was captured by the Rev. R. P. Murray in the Isle of Man (Proc. Ent. Soc. 1871, p. xxxi.). The specimen of *Orgyia antiqua* (?) mentioned on p. 228 was a female, and was exhibited by Mr. Jenner Weir at the meeting of this Society held on the 5th November, 1879 (*ante*, p. xlix.)

† Surely the specific name of the new *Polycetenes* parasitic on a bat (*Megaderma spasma*), described by Mr. Waterhouse on p. 312, should be *P. spasmatidis*, not *spasme*!

appear to let judgment go against them by default. Scarcely have the scales fallen from our eyes, and enabled us to see where the clear-winged moths ought to be placed, before Mr. Butler draws the Grey Dagger, and calls upon us to surrender at discretion, and make humble confession that under the name *Acronycta* we have hitherto huddled together representatives of eight genera belonging to four distinct families; that three-fourths of these so-called Noctuæ are in truth Bombyces; that of our English species *rumicis* and *auricoma* are *Arctiidæ*; *leporina* and *aceris* are *Liparidæ*; *megacephala*, *strigosa*, and the common dagger-moths, *psi* and *tridens*, are *Notodontidæ*; and that only *alni* and *ligustri* are Noctuæ, the former being the type of *Jocheæra*, whilst the latter is relegated to *Mamestra*. Such is the result at which Mr. Butler has arrived, chiefly from a consideration of the larval characters,\* but relying also upon the wing-venation and structural

\* The larvæ of our indigenous species are delineated on plates xxxi. and xxxii. of Wilson's 'Larvæ of the British Lepidoptera.' But the reference on p. 207 to plate xxxii., fig. 6, as *Acronycta tridens*, is a misprint for fig. 1.

Ochsenheimer, in the *Systema Glossatorum Europæ*, published in the fourth volume of 'Die Schmetterlinge von Europa' (1816), divided *Acronycta* into two divisions; A. containing *leporina*, *alni*, *psi*, *tridens*, and others; B. containing *menyanthidis*, *auricoma*, *rumicis*, *aceris*, *megacephala*, and others. Ochsenheimer, however, died before he reached *Acronycta* in the descriptive part of his work, and it was with this very genus that Treitschke commenced his continuation of Ochsenheimer (*Schmett. Europ. v. 3*). In the preface he tells us that unfortunately Ochsenheimer's papers gave him much less assistance than he had hoped, that of the descriptions contained in the fifth volume only the genus *Acronycta* had been worked out, and that in that genus those of *leporina*, *bradyporina*, *cuspsis*, *euphorbiæ*, and *euphrasiæ* had not been worked out, by Ochsenheimer. After saying that "die Raupen kommen denen der ehemaligen Spinner nahe," Treitschke indicates two divisions: A. Larvæ with long hairs, without dorsal tufts; and B. Larvæ with long hairs, with dorsal tufts. Treitschke's A includes seven species, *leporina*, *bradyporina*, *aceris*, *megacephala*, *alni*, *ligustri*, and *strigosa*; and his B includes eight species, *tridens*, *psi*, *cuspsis*, *menyanthidis*, *auricoma*, *rumicis*, *euphorbiæ*, and *euphrasiæ*. Thus Treitschke's A and B do not agree with Ochsenheimer's A and B, but *leporina* stands at the head of the division A of each, and it is probably on this ground that Mr. Butler takes *leporina* as the type of the restricted genus *Acronycta*, which finds its place in the family *Liparidæ*. In the matter of spelling Mr. Butler appears to prefer *Diphthera* and *Acronieta* to *Diphthera* and *Acronycta*; after twice citing "*Acronieta* (sic), Ochs.," he adopts that form on pp. 316, 317 for the restricted genus, I suppose on the ground of priority. For doubtless Ochsenheimer, in the Catalogue referred to (*Schm. Europ. iv. 62, 63*), did print or misprint *Acronieta* and *Diphthera* (apparently following Hübner as regards *Diphthera*); but when the genera came to be described in 1825 we find the correct spelling *Acronycta* (*Schm. Europ. v. 3*) and *Diphthera* (*ib. 47*), and, to prevent any mistake, the Greek words from which they are derived. After fifty-five years' use of the right, it is too late to revert to the wrong.

characters of the moths. That a casual peep at a drawer-full of larvæ should produce such a transformation-scene says little for our lepidopterists; and if Mr. Butler's views are to prevail, it shows what wholesale disintegration of a system, based on mere superficial resemblance of the imago, in which for years we have all been content to acquiesce, may be expected to ensue when attention is paid to the earlier stages, and when, instead of merely collecting so many butterflies and moths and arranging them in a cabinet, the insects are studied *ab ovo*, and their metamorphoses and habits are thoroughly investigated.

Of course the publications of this Society represent but a portion of the work of our entomologists during the year; and in referring to three recent publications on the comparatively neglected groups of the Spiders, the Plant-lice, and the Crayfish, my only regret is that we have not the honour to count their authors amongst our members. In 'The Spiders of Dorset,' the Rev. O. Pickard Cambridge has produced a little volume, the introduction to which raises it far above the level of ordinary local lists; Blackwall's 300 British species are now increased to over 500; of these 358 have been found in Dorsetshire, nearly 70 per cent. of the whole in one county, and by far the greater part of them in the parish of Bloxworth; whence the inference is easy, that with a few more Cambridges scattered about the land, the number of British Spiders would not long remain at five hundred: the second volume is to contain, by way of Appendix to the County List, a Supplemental List with diagnoses of the British species which have not yet been found in Dorsetshire, and the work will thus form a complete monograph of the British Arachnida. The Ray Society has produced the second volume of Mr. Buckton's 'Monograph of the British Aphides,' a work which ought to have the effect of increasing the number of students of our plant-lice; there are 99 beautiful plates, and another volume is required to complete the task. Under the unassuming title of 'The Crayfish,' Prof. Huxley has written a capital little book, in which, after adverting to the not uncommon belief that what is termed science is of a different nature from ordinary knowledge, and that the methods by which scientific truths are ascertained involve mental operations of a recondite and mysterious nature, comprehensible only by the initiated, the author asserts that there is no solid foundation for the belief that

the realm of science is thus shut off from that of common sense, or that the mode of investigation which yields such wonderful results to the scientific investigator is different in kind from that which is employed for the commonest purposes of everyday existence. "Common sense is science exactly in so far as it fulfils the ideal of common sense, and science is simply common sense at its best, that is, rigidly accurate in observation, and merciless to fallacy in logic." Starting with this idea, the Professor, with all that charm of language and lucid exposition of which he is so consummate a master, proceeds to display the natural history of *Astacus fluviatilis*, the common crayfish of our rivers, then to enquire into its morphology and physiology, and finally to examine into the distribution\* and what he terms "the crown of biological effort," the ætiology of this group of animals. And the reader is thus shown how the careful study of one of the commonest and most insignificant of creatures leads step by step from everyday knowledge to the most difficult problems of Zoology and the widest generalizations of Biological Science.

Meanwhile our colleagues have not been idle. Mr. Owen Wilson has issued the two concluding parts of his illustrations of 'Larvæ of the British Lepidoptera'; Mr. Herbert Goss has continued his admirable papers, 'On Fossil Insects and the British and Foreign Formations in which Insect Remains have been detected'; Mr. M'Lachlan has produced the eighth and penultimate part of his 'Monographic Revision and Synopsis of the Trichoptera of the European Fauna,' containing the family *Rhyacophilidæ*; and Messrs. Godman and Salvin have issued the first two parts of the zoological portion of their 'Contributions to the knowledge of the Fauna and Flora of Mexico and Central America', a magnificent quarto, to be published in parts at intervals of a couple of months, and estimated to extend to not less than sixty parts of Zoology, to be followed by an introductory volume wherein the physical features of the country will be described and illustrated with maps. The region from which contributions are to be levied includes the whole of Mexico from

\* Crayfishes do not inhabit every British river; and Prof. Huxley says (p. 288) that he cannot hear of any, for example, in the Cam or the Ouse on the east, or in the rivers of Lancashire and Cheshire on the west. Unless my memory deceives me as to the occurrences of five-and-thirty years ago, there were then crayfish in the Little Ouse, near Brandon.



the valleys of the Rio Grande and Gila on the north, British Honduras, the States of Guatemala, Honduras, San Salvador, Nicaragua, and Costa Rica, and Panama as far south as the Isthmus of Darien. For this work the editors have been qualifying themselves by collecting materials for the last twenty-two years; they have passed several years in various parts of the country, and have received collections from many correspondents and from naturalists specially employed in visiting some of the districts previously unexplored. A work of such magnitude can only be achieved by co-operation; as regards our branch of Zoology, the editors themselves will undertake the Rhopalocerous Lepidoptera, and (whilst the Crustacea are allocated to Prof. Huxley, the Arachnida to the Rev. O. Pickard Cambridge, and the Hymenoptera and Diptera are still waiting for collaborateurs) the names of Messrs. Bates, Distant, Druce, Gorham, Janson, M'Lachlan, Sharp, Waterhouse, and Wood-Mason will commend the work to this Society. The two parts published in September and November last contain portions of the Lepidoptera Rhopalocera (*Nymphalidæ*, *Danainæ*) by Messrs. Godman and Salvin, and of the Coleoptera Longicornia (*Prionidæ* and *Cerambycidæ*) by Mr. H. W. Bates. It is a grand design which promises to be grandly executed, and when completed in accordance with the promise of its outset, I have no hesitation in saying that the 'Biologia Centrali-Americana' will be one of the noblest faunistic works which this or any other country has produced.

The publications of our sister societies have not been without entomological contributions. I have already alluded to the 'Account of the Petrological, Botanical, and Zoological Collections made in Kerguelen's Land and Rodriguez during the Transit of Venus Expeditions carried out by order of Her Majesty's Government in the years 1874-5,' which has recently appeared under the auspices of the Royal Society. It will be remembered that our colleague, the Rev. A. E. Eaton, who had already visited the Arctic Regions, was selected as the naturalist of the Expedition to Kerguelen's Land; and he, with the assistance of Messrs. Cambridge, Verrall, C. O. Waterhouse, and Sir J. Lubbock, has rendered an account of the entomological results of his Antarctic Expedition; whilst the corresponding work for the Expedition to Rodriguez has been done by Messrs. Butler, F. Smith, and C. O. Waterhouse. In the Transactions of the

Linnean Society will be found a paper on "The Butterflies of Malacca," by Mr. A. G. Butler, and "Descriptions of some minute Hymenopterous Insects," by Prof. Westwood. The Journal of the same Society (Zoology, vol. xiv.), besides the posthumous paper by Mr. F. Smith already mentioned, contains "Descriptions of new Hemiptera," by Dr. Buchanan White; "Descriptions of new Coleoptera collected by Mr. Darwin," by Mr. F. H. Waterhouse; "An Analysis of the Species of Caddisflies described by Linnæus in his Fauna Suecica," by Pastor H. J. D. Wallengren, with Notes by Mr. M'Lachlan; "Observations on the Habits of Ants," by Sir John Lubbock; and an abstract of a paper by the same author, "On the Anatomy of Ants," which is reserved for publication in the Transactions, with illustrations. The Proceedings of the Zoological Society contain no less than eleven entomological papers (two in the volume for 1878, but published in 1879), including three on Lepidoptera by Mr. F. Moore, two on Coleoptera by Mr. Martin Jacoby, two on Arachnida by the Rev. O. Pickard Cambridge, one on Lepidoptera by Mr. Distant, and three on Lepidoptera by Messrs. Godman and Salvin.

Nearly all these memoirs are by Fellows of this Society, and I take this to indicate that the means of the Entomological Society are insufficient to keep pace with the productive capacity of its members. It *can* only be from their unwillingness to overtax our resources that our past and present Presidents, Vice-Presidents, Treasurers, and Secretaries are driven to have recourse to other Societies for the publication of purely entomological papers.

This leads us naturally to the consideration of our finances. The prosperity of the Society is in proportion to the number of our members, and depends mainly on a steady increase in the number. The Society started with about 100 members; during the first ten years of its existence the number gradually increased, and was eventually doubled; the tide then turned, and we dwindled down to 120; after small fluctuations, at the end of thirty years the number was under 150, but the next lustrum brought us back to 200, and for several years the number was maintained at or about that figure; during the last few years there has been a slow but steady growth, and at the present time we count 230. Corresponding with these changes, our

publishing power has risen and fallen. The first five volumes of the 'Transactions' extended over sixteen years, and during that period we published on an average fifteen memoirs per annum; the second series occupied twelve years, with an annual average of twelve memoirs; the third series appeared in six years, at an average of eighteen memoirs a year; and since the annual volumes have superseded the series, the yearly average of papers published has been twenty-two, say a couple of papers read at each successive meeting. In forty-six years the Society has printed 763 memoirs, illustrated by 437 plates, of which 189 are coloured. These memoirs vary in length from two or three pages to two or three hundred, and even to a whole volume: of course mere length is no criterion of their value or importance; they should be weighed, not measured; but taking one with another over the whole period of the Society's existence, this gives an average of nearly seventeen papers and ten plates a year. Our income available for publishing purposes, even of late years, has not exceeded a couple of hundred pounds, and even this is uncertain and precarious. I think it may be fairly said that the Society has made pretty good use of its slender means; and I am sure I may say that the slender means at the disposal of the Council are the only reason why the Society has not done more. At every turn we have been hampered for want of funds; the Treasurer has been at his wit's end to make ends meet. When a monograph is presented, and illustrations are required, instead of being able to confine our attention to the question, "Is it worthy of publication, will it do credit to the Society?" a second question lurks behind, "Can we afford it?" How is this to be avoided? The Society ought not to be a casual pauper, dependent on accidental or eleemosynary support. It ought to be self-supporting; and there are only two ways of accomplishing this. We must either limit our usefulness to the extent of our income, or we must increase our income to the extent of our requirements. The former alternative is inadmissible unless the latter be impossible. The latter is impossible unless we do one of two things. Either the subscription must be increased or the number of subscribers must be increased. There is no Society in this country, at all comparable with our own, which levies so small an annual contribution; and if every member received the Transactions without further payment, as I should like to see, it

strikes me that we should have little cause for regret if the yearly subscription were doubled. This, however, is a question that requires deliberation; nothing short of a general agreement would warrant its adoption, and I throw out the suggestion only for the purpose of eliciting opinion and inviting discussion. But as to the desirability of the other alternative, there can scarcely be two opinions; our numbers ought to be larger; 230 names, and the list includes some foreigners, are not an adequate representation of the entomologists of the United Kingdom. To increase the number, there is little scope for collective or corporate action; we can only rely upon the individual influence and efforts of those who have already joined our ranks. Go out then to the highways and hedges, and compel them to come in.

To be valued by the public and obtain their support, the Society must contrive to render itself more useful. It is too much to expect, in this old-fashioned country, that the Government should give us any assistance; the State cannot even afford us house-room. But the time will come when our existence and our usefulness will be recognised by the powers that be. Noxious insects have often been mentioned in despatches; and a beetle has achieved the unprecedented distinction, the Victoria Cross (with several bars), of being mentioned by its scientific name in an Act of Parliament (40 and 41 Vict. c. 68) as "the insect designated as *Doryphora decemlineata*, and commonly called the Colorado beetle." When Empires, Kingdoms, and Republics have to sink their differences, and France, Germany, Austria-Hungary, Portugal, and Switzerland agree to a Phylloxera-treaty, and, distrusting the sufficiency of their united forces, are seeking the adhesion of Italy and Spain,—when our consuls abroad are occupied in defeating the machinations of the Anisoplias and other nihilists of the crops (see Proc. Ent. Soc. 1878, pp. liii., lvii.),—when the three estates of this realm have to combine to repel an invasion of the Doryphoras, and our colonies and dependencies are making constant appeals to the home authorities, either to exterminate a horde of savage Termites, or to ward off the attacks of native tribes of Tzetzes, the aid of the scientific branches will be called in requisition, and even the services of the volunteers will not be despised. But seriously, Natural Science has, happily, become part of our general system of education; our schools and

universities no longer ignore it; the applicability of entomology to useful purposes is becoming more generally known; and it must be our aim, whilst retaining and cherishing the true scientific spirit, and taking care that our pursuit becomes more and more philosophic, at the same time to apply our enquiries and our facts to purposes of utility and public interest. Do we not ride our own special hobby-horses a little too hard, and so deter those who are not specialists from joining us? Could we not attract a wider support if our energies were more directed to purposes of general interest? Could we not organize a series of periodical reports on injurious insects, and so secure the adhesion of agriculturists and horticulturists? Can we not obtain for our Transactions more papers of an anatomical or philosophic character, more papers on classification or distribution, on the morphology and development of insects, on the light thrown by entomology on the problems of general biology? Papers like these would be readable by naturalists who are not specially entomologists. We want more observational work, and less description of species; and I am very much afraid that so long as our Transactions are almost monopolized by descriptive entomology, until we can obtain a larger proportion of papers of more general interest, it will be hopeless to expect any considerable addition to our muster-roll.

“The habits, manners, and instincts of insects, their anatomy and physiology, and their useful or noxious properties, will doubtless attract a large share of the attention of the members of the Entomological Society, without inducing them to underrate the importance of the systematic department of the science. Knowledge as to the structure, habits, and economy of insects ought to be the grand and ultimate aim of entomologists; but this knowledge can be neither acquired nor diffused without systematic classification, which is the dictionary that must enable us duly to read the great book of Nature, and to which therefore, so long as that dictionary still remains so incomplete, even the largest portion of the entomologist’s labours may be justly given, while at the same time no fact, however trifling, relating to the habits and economy of the objects of his study is suffered to be lost, the two great branches of the science, system and the natural history of insects (taken in its largest sense) being made to go hand in hand, and mutually to support each other.”

Thus wrote the veteran Wm. Spence in 1834 (*Tr. Ent. Soc.* i. 1). And in his first Address on the Progress and State of

Entomology (21st January, 1835), Mr. Westwood expressed his gratification at the practical nature of a considerable portion of the proceedings of our Society, and remarked upon the difference which then existed between the Entomological Societies of London and of France, the latter being especially marked by a greater degree of attention to the technical and descriptive details of groups.

In those days two-thirds of the papers published in our Transactions dealt with the natural history of insects; ten or a dozen years ago, taking an average of three years, the descriptive papers were barely a half of the whole; during the last three years the general papers have borne to the descriptive the proportion of three to five; but for the year 1879 the proportion is only about one to five.

Were it not that the Address delivered from this Chair a year ago must be as fresh in your recollection as it is in mine, I should venture to repeat what was then said:—"We want, besides the excellent papers descriptive of new exotic species which have too exclusively filled our pages, records of observations on habits, life-histories, and geographical distribution of insects; on local variation, its causes and results; narratives of entomological excursions and captures; observations on structure, functions, and instinct; relations of insects to flowers; and, in short, on all such subjects as are interesting to the greater number, as distinguished from descriptive papers which are interesting only to the lesser number."

This is unquestionably our present desideratum, and in endeavouring to enforce the same view, the scientific repute of Mr. Bates will protect me, too, from the charge of seeming to sacrifice science to popularity. I want you to be more popular, only that you may be more truly scientific.

Science moves, but slowly, slowly, creeping on from point to point.

Unless each addition to our knowledge is diffused and popularized, it were as well that science remained stationary. Knowledge is for all; and science undiffused is like the miser's hoarded gold. The spread of entomological science is the purpose for which we exist as a Society; the Society can only be a distributor, not a producer or discoverer; and that we may have somewhat to distribute that shall add to the stock of human

knowledge and human happiness, it is to our members that we must look—

Men the workers, ever reaping something new,  
That which they have done but earnest of the things that they shall do.

The Society will shortly celebrate its jubilee, and I would ask you betimes to take into consideration how we can best mark the event. It strikes me that the occasion should be signalized in some way or other, and in a manner that will have some enduring effect. Our reserve fund is small, and might with advantage be increased. A substantial addition to the library, in the shape of expensive books not easily accessible, would be acceptable. The catalogue of our library ought to be printed. Incorporation by royal charter is not beyond our hopes. But I almost think that preferable to any of these would be a permanent addition to our ranks of (say) another fifty or a hundred members. Is it too much to expect that by a long pull, a strong pull, and a pull altogether, we should within the next three years succeed in obtaining a substantial reinforcement, and be able to publish a Jubilee List of not less than 300 members?

From what I have already said, it must be abundantly plain that I desire to appeal to a wider constituency, and to bring within our fold all who can in any sense be called entomologists, or induced to take an interest in entomology. Entomologists are divisible into many groups. Each has his place in nature, and his own work to do; and each requires the aid of the others. There is room for all; and when a votary of one branch sneers at or disparages the cultivators of another branch, he is only exhibiting his own lack of scientific and philosophic spirit, and uttering under a thin disguise the Pharisaic "Thank God that I am not as other men!" Even a mere collector is not to be repelled, but cherished and encouraged to become something higher. I remember to have heard years ago of some selfish brute who was said to destroy duplicate specimens, that he might boast of his uniques; as if there were any great credit due to a man for being the first to pick up a thing which any other man at the same time and place could equally have done! Even such a one is not beyond redemption: after priding himself on uniques, the next step is to long for fine series, and this is an advance, for he is thus led on to notice variation in species and genera, to seek the limits of such variation, to trace the connexion

between one form and another, to discover affinities between different groups, perchance to study their transformations and habits, possibly to call the microscope in aid to investigate their anatomy; and by degrees he who was once a collector, and nothing more, develops into a naturalist worthy of the name. So also there is hope for a describer or a synonymist: the latter can scarcely fail at some time or other to realize the fact that science is not a thing of names alone, but that we have living things to contemplate and study; and though the former's vanity is at first tickled by the sight of a "*Papilio mirabilis, mihi*," and he plumes himself upon his achievement as if, forsooth, he had created the insect, and talks of it as "my species," this silly conceit must soon give way to a more legitimate kind of parental pride; for though the naming of a creature unnamed before is nothing more than affixing a label by which it may in future be distinguished, yet a man may have a justifiable feeling of fondness for an object he has been the first to bring to light, and it is something to have been the first to distinguish accurately between two species which before were confounded. Mere description of species is only singling out bricks and marking them for the master-builder; it is the builder who arranges the materials, and, by placing them in their proper position and relationship, gives sensible exposition of the architect's design. The naming and description of species is necessary, but it is only a means to an end. Let us then not be satisfied with mere descriptions, but let us rather try to make use of the accumulated mass of descriptive work; let us investigate and record the natural history and transformations of species, their anatomical structure, and their natural relations to one another; let us attack the larger and higher problems of biology by applying our collected facts to the elucidation of the general laws of life, and bringing scattered details to illustrate the grand scheme of Nature.

It has been well said that the qualifications required for a perfect naturalist are as many and as lofty as were required by old chivalrous writers for the perfect knight-errant of the middle ages. And though we cannot hope that all will attain to the ideal, may I, in conclusion, presume to exhort my hearers to attempt to realize Charles Kingsley's sketch:—

"Our perfect naturalist should be strong in body; able to haul a dredge, climb a rock, turn a boulder, walk all day, uncertain where he shall



eat or rest ; ready to face sun and rain, wind and frost, and to eat or drink thankfully anything, however coarse or meagre ; he should know how to swim for his life, to pull an oar, sail a boat, and ride the first horse that comes to hand ; he should be a good shot, and a skilful fisherman ; and if he go far abroad, be able on occasion to fight for his life. For his moral character, he must, like a knight of old, be first of all gentle and courteous, ready and able to ingratiate himself with the poor, the ignorant, and the savage ; not only because foreign travel will be often otherwise impossible, but because he knows how much invaluable local information can be only obtained from fishermen, miners, hunters, and tillers of the soil. Next, he should be brave and enterprising, and withal patient and undaunted ; not merely in travel, but in investigation ; knowing (as Bacon might have put it) that the kingdom of Nature must be taken by violence, and that only to those who knock long and earnestly does the great mother open the doors of her sanctuary. He must be of a reverent turn of mind also ; not rashly discrediting any reports, however vague and fragmentary ; giving man credit always for some germ of truth, and giving Nature credit for an inexhaustible fertility and variety, which will keep him his life long always reverent, yet never superstitious ; wondering at the commonest, but not surprised by the most strange ; free from the idols of size and sensuous loveliness ; able to see grandeur in the minutest objects, beauty in the most ungainly ; holding every phenomenon worth the noting down ; believing that every pebble holds a treasure, every bud a revelation ; making it a point of conscience to pass over nothing through laziness or hastiness, lest the vision once offered and despised should be withdrawn ; and looking at every object as if he were never to behold it again. Moreover, he must keep himself free from all those perturbations of mind which not only weaken energy, but darken and confuse the inductive faculty ; from haste and laziness, from melancholy, testiness, pride, and all the passions which make men see only what they wish to see. Of solemn and scrupulous reverence for truth, of the habit of mind which regards each fact and discovery, not as our own possession, but as the possession of its Creator, independent of us, our tastes, our needs, or our vain-glory, we hardly need to speak ; for it is the very essence of a naturalist's faculty, the very tenure of his existence ; and without truthfulness, Science would be as impossible now as chivalry would have been of old. And last, but not least, the perfect naturalist should have in him the very essence of true chivalry, self-devotion ; the desire to advance, not himself and his own fame or wealth, but knowledge and mankind. He should have this great virtue ; and in spite of many shortcomings, naturalists as a class have it, to a degree which makes them stand out most honourably in the midst of a self-seeking and mammonite generation, inclined to value everything by its money price, its private utility. The spirit which gives freely, because it knows that it

has received freely; which communicates knowledge without hope of reward, without jealousy and mean rivalry, to fellow-students and to the world; which is content to delve and toil comparatively unknown, that from its obscure and seemingly worthless results others may derive pleasure, and even build up great fortunes, and change the very face of cities and lands, by the practical use of some stray talisman which the poor student has invented in his laboratory: this is the spirit which is abroad among our scientific men, to a greater degree than it ever has been among any body of men for many a century past, and might well be copied by those who profess deeper purposes and a more exalted calling than the discovery of a new zoophyte or the classification of a moorland crag. And it is these qualities, however imperfectly they may be realized in any individual instance, which make our scientific men, as a class, the wholesomest and pleasantest of companions abroad, and at home the most blameless, simple, and cheerful, in all domestic relations; men for the most part of manful heads, and yet of childlike hearts, who have turned to quiet study, in the piping times of peace, an intellectual health and courage which might have made them, in more fierce and troublous times, capable of doing good service with very different instruments than the scalpel and the microscope."

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## APPENDIX TO 'PROCEEDINGS.'\*

### I. THE HOPE PROFESSORSHIP OF ZOOLOGY.

(Statuta Universitatis Oxoniensis 1879, p. 321 *et seq.*)

REGULATIONS contained in an Indenture made December 20, 1860, between the Reverend FREDERICK WILLIAM HOPE, of the one part, and the Chancellor, Masters, and Scholars of the University of Oxford, of the other part, for declaring the trusts of £10,000 new £3 per cent. annuities transferred by Mr. HOPE to the University.

1. There shall be for ever hereafter a Professor, to be called the "Hope Professor of Zoology," and the dividends arising from the said sum of £10,000 new £3 per cent. annuities shall from time to time, as and when the same become due, be paid to such Professor, subject as hereinafter provided.

2. The nomination of the first and every subsequent Hope Professor, during the lifetime of the said Frederick William Hope, shall be made by the said Frederick William Hope.

3. Every subsequent Hope Professor, after the death of the said Frederick William Hope, shall be elected by the Curators for the time being of the Hope Collections, or by the majority of those present at such election; each Curator having one vote, and the Linacre Professor of Physiology for the time being shall have the same right of voting as if he were a Curator; and in case of an equality of votes for two candidates, the Vice-Chancellor for the time being shall have a second or casting vote.

4. The Hope Professor shall be admitted in Convocation in the same manner as other Professors.

5. The Hope Professor shall at the time of his admission be at least a Master of Arts or a Bachelor of Civil Law or Medicine.

6. The duty of the Hope Professor shall be to give public lectures and private instructions on Zoology, with special reference to the Articulata, at such times as shall be prescribed or approved by the University, and also

\* *Vide Proc.*, p. xlviiii *antè*.

to superintend and arrange the Hope Collection of Annulose animals, and to take charge of the Natural History portion of the Hope Library.

7. The Hope Professor shall reside in the University for the term of eight months in every academical year between the first of October and the fifteenth of July.

8. The Hope Professor shall retain his office during good behaviour.

9. In case of illness or unavoidable absence of the Hope Professor, the Hope Curators shall have the ordinary power to appoint a temporary deputy.

10. In case of permanent inability of the Hope Professor to perform the duties of the professorship, the Hope Curators shall have the ordinary powers to appoint a permanent deputy, with such stipend out of the Hope Professor's emoluments as to the Hope Curators shall seem fit.

11. The Vice-Chancellor and delegates of appeals in Congregation, or the greater part of them, shall have power to proceed against the Professor in case of misconduct, in the same manner as is provided by the statutes respecting the Moral Philosophy Professor and other Professors, sanctioned by her Majesty; and in the event of their finding it necessary to remove the Professor, the said Frederick William Hope, if living, and if he shall not be then living the Hope Curators for the time being, shall immediately proceed to a fresh election.

12. The Hope Professor shall be entitled to receive from his auditors such fees only as shall be fixed by the University, in addition to the dividends arising from the said £10,000 new £3 per cent annuities.

13. *The Hope Professor shall not hold any other professorship or readership in the University.*

## II. THE HOPE COLLECTIONS, AND THE KEEPER OF THE HOPE COLLECTION OF ENGRAVINGS.

(a) Conditions set forth in the Deed of Gift of the Entomological Collection, Library of Natural History, plates, engravings, and other articles and effects of the Reverend FREDERICK WILLIAM HOPE, dated August 4, 1849, approved by Convocation April 23, 1850.

1. That a suitable building or rooms shall be provided within the University for the reception of the said Collection, Library, articles, and effects, as soon as conveniently may be arranged, either at the expense of the said University or by means of contributions from other sources.

2. That the said Collection, Library, articles, and effects shall be made practically useful, as a means of extending and improving a knowledge

of the entomological department of Natural History; and that for that purpose the same shall at all seasonable times be free of access to members of the University and other persons, especially to learned naturalists and other scientific persons of foreign countries; subject, however, to such regulations as the Curators for the time being shall think fit; and it being hereby declared to be the wish and desire of the said Frederick William Hope, that, so far as may be found practicable and convenient, the said collection shall be open daily between the hours of ten in the morning and three in the afternoon in winter, and ten in the morning and four in the afternoon in summer, Sundays and holidays excepted.

3. (*Decr. Conv., Dec. 13, 1864.*) That the Vice-Chancellor, the two Proctors, the Regius Professor of Medicine, the Keeper of the Ashmolean Museum of the said University, and the Hope Professor, and their successors in the same several offices for the time being, and also the Reverend Richard Greswell, of Worcester College, B.D., and Henry Wentworth Acland, of All Souls College in the said University, D.M., and their successors to be appointed from time to time as hereinafter mentioned, shall be Curators. And upon the death, refusal, or incapacity to act of the said Richard Greswell and Henry Wentworth Acland, or either of them, then a new Curator or two new Curators, as the case may be, shall be nominated by the surviving or other Curators; such nomination to be approved by the University in Convocation: and so from time to time, as often as any vacancy shall occur in any or either of the non-official Curators; it being the intention that there shall always be two other Curators in addition to the five official Curators.

4. That the Curators for the time being shall have full power and authority, from time to time, as they shall see fit, to frame rules and regulations for the safe custody and preservation of all the property, and for the management of and access to the said collection, and for the use of the library; but, in the event of a Managing Curator or Inspector being appointed for the better custody and preservation of the said collection, the consent of the said Frederick William Hope during his lifetime shall be necessary to such appointment.

5. That the Curators shall also have power, on obtaining the consent thereto of the said Frederick William Hope during his lifetime, and after his decease of their own authority, to dispose of any duplicates in the entomological collection to any museum, institution, or person, upon such terms and such manner as they shall think proper; but that this power shall not extend to the disposing of any other specimens comprised in the said collection. And, with a view to prevent any infected insect being added to and injuring the said collection, no addition shall be made thereto, unless previously approved of by the said Frederick William Hope or some competent person under the authority of the Curators.

6. That if a new University Museum shall be established in Oxford, and a library formed in connection with it, the Curators shall have power to place the whole of this collection in suitable rooms to be provided in such Museum; but the library and the plates and engravings shall in any case be under the entire control of the Curators, who may dispose of the same in any way which they shall consider most conducive to the study of Natural History within the University, as well as to the use of the same in connection with the entomological collection.

7. That in all the more important proceedings relative to the collection, such as the framing new rules or regulations, the appointment of Curators, and the disposition of duplicates or of the Library, the concurrence of four at least of the Curators present at a meeting to be called for any such purpose shall be requisite.

(b) Regulations contained in an Indenture made July 5, 1862, between ELLEN HOPE, widow and sole executrix of the Reverend FREDERICK WILLIAM HOPE, of the one part, and the Chancellor, Masters, and Scholars of the University of Oxford, of the other part, for declaring the trusts of £10,000 new £3 per cent. annuities transferred by Mrs. HOPE to the University.

*N.B.—The recital of the indenture speaks of the indenture of December 20, 1860, relating to the Hope Professor of Zoology, and mentions Dr. Wellesley as one of the Hope Curators.*

8. Of the dividends of the £10,000 new £3 per cent. annuities so transferred by the said Ellen Hope as aforesaid, one-third shall be paid as a stipend to the Keeper of the Hope Collection of Engravings for the time being, one-third to the Hope Professor of Zoology for the time being in augmentation of his present income, and the remaining one-third shall be paid to the Hope Curators or any two of them, and shall be applied, as to one moiety, in keeping up and increasing the Hope Collection of Portraits, and, as to the other moiety, in keeping up and increasing the said entomological collection.

9. The Hope Curators shall have absolute discretion as to the portraits and specimens to be purchased in augmentation of the said collections respectively; but, in adding to the said entomological collection, they shall have regard to the opinion of the Hope Professor of Zoology, and shall not be bound to confine themselves to insects only, but may purchase specimens of fishes, reptiles, and such other animals as he shall recommend and the Curators shall consider to come within the scope of the Founder's views.

10. The Hope Curators shall also have power to expend part of the dividends applicable for the purposes of the said collections respectively in purchasing or repairing cabinets, cases, or other things connected therewith.

12. Additions made to the said collections respectively shall be duly noted and catalogued; but the Catalogues now and hereafter to be made shall be so framed that such additions may always be distinguished, and may not be confounded with the original gifts.

13. In the event of the Hope Curators not meeting in every year with portraits or specimens suitable in their judgment for increasing the said collections respectively, they may invest and accumulate any surplus income, but keeping separate accounts of such investments, and with the obligation to apply all such accumulations as income for the purposes aforesaid in some year or years within five years from the commencement of the accumulation. Provided always that under no pretence whatsoever shall the income hereby intended for keeping up and increasing the said collections respectively, or any part thereof or any accumulation thereof, be applied for the personal benefit of the Keeper, the Hope Professor, or any other person or persons.

14. Proper books of accounts shall be kept by the Hope Curators, in which full particulars shall be entered of the application of the dividends hereinbefore made payable to them, and such accounts shall be audited in the month of October in every year.

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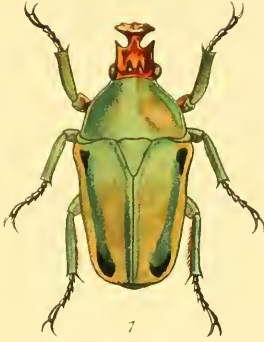
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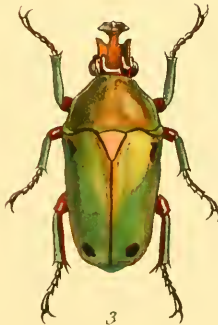
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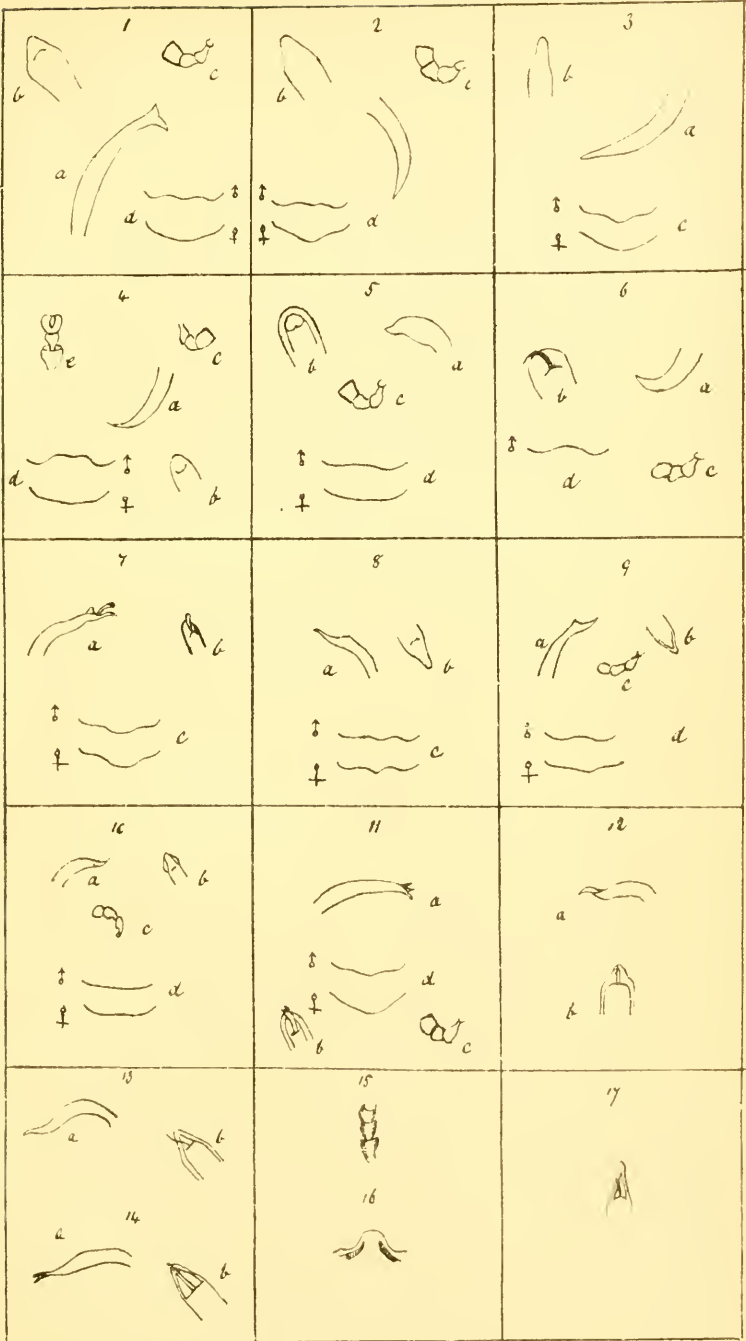


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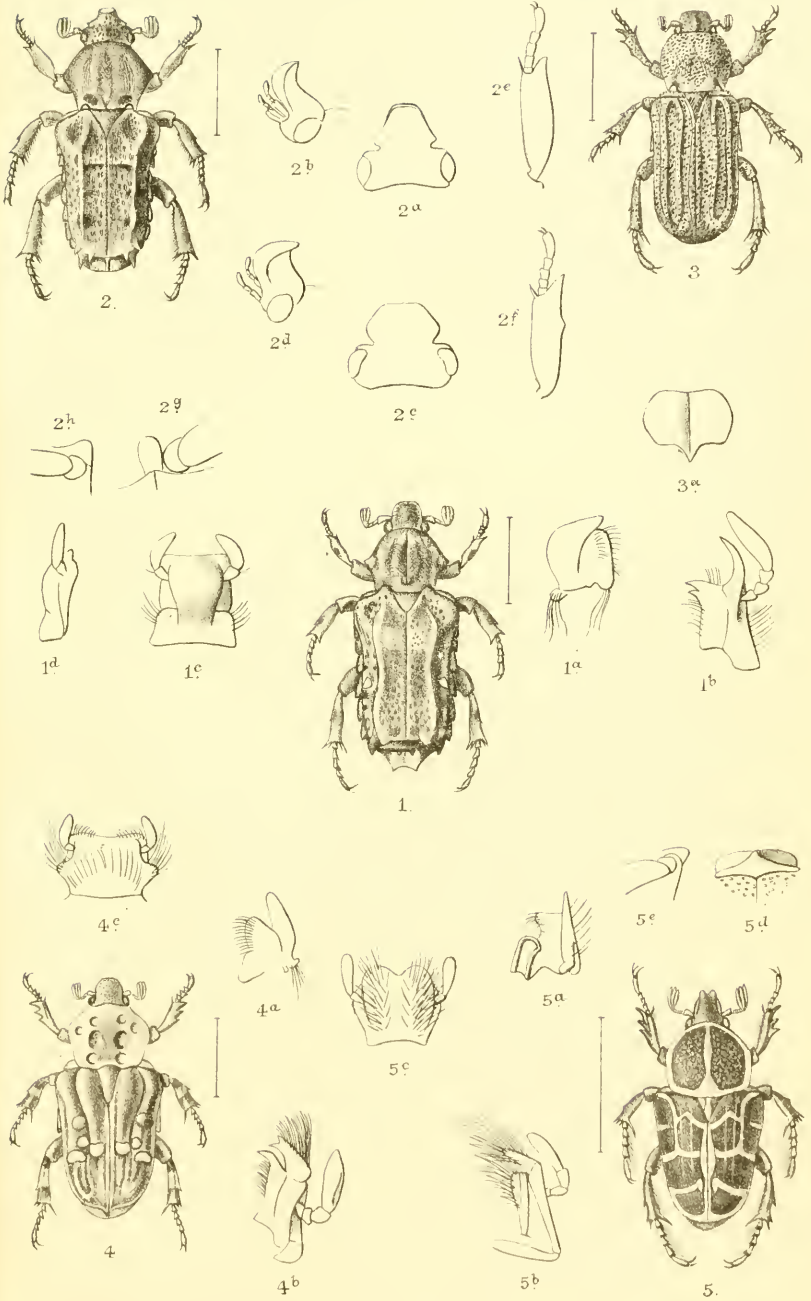
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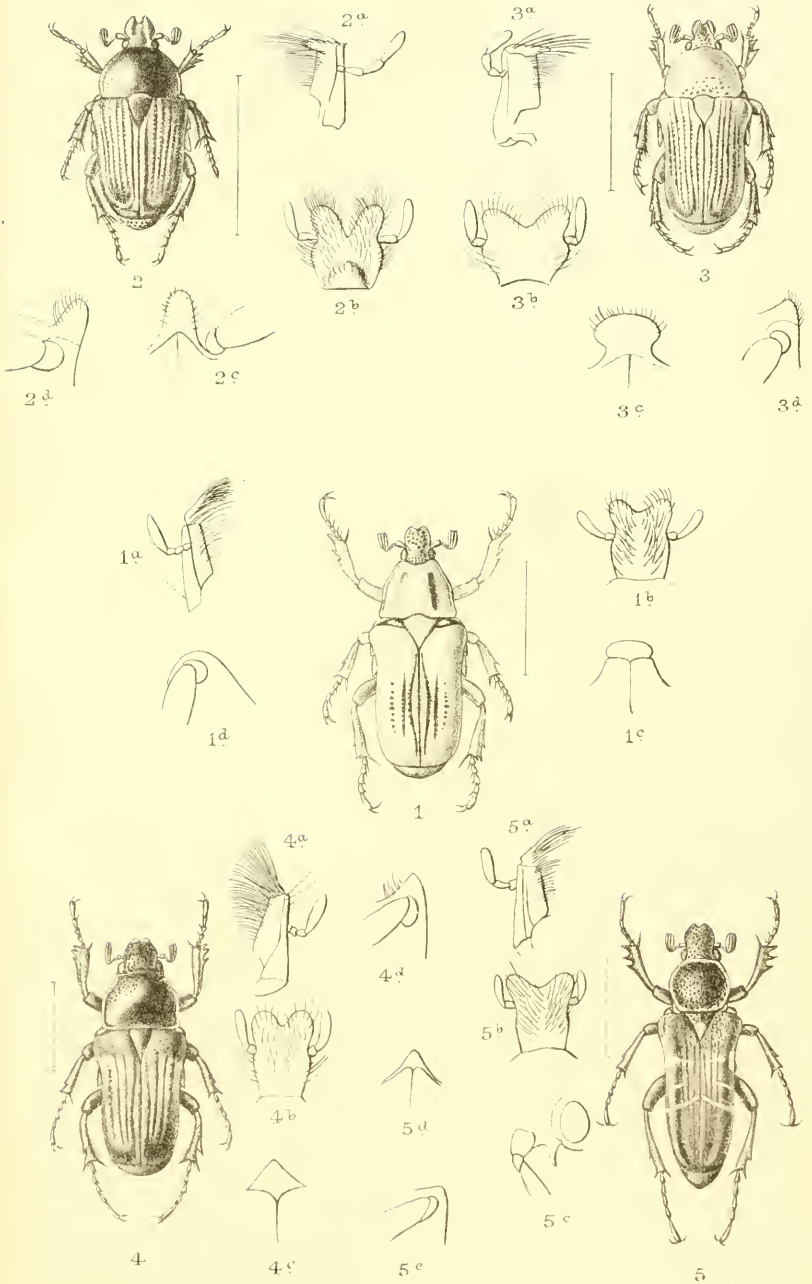




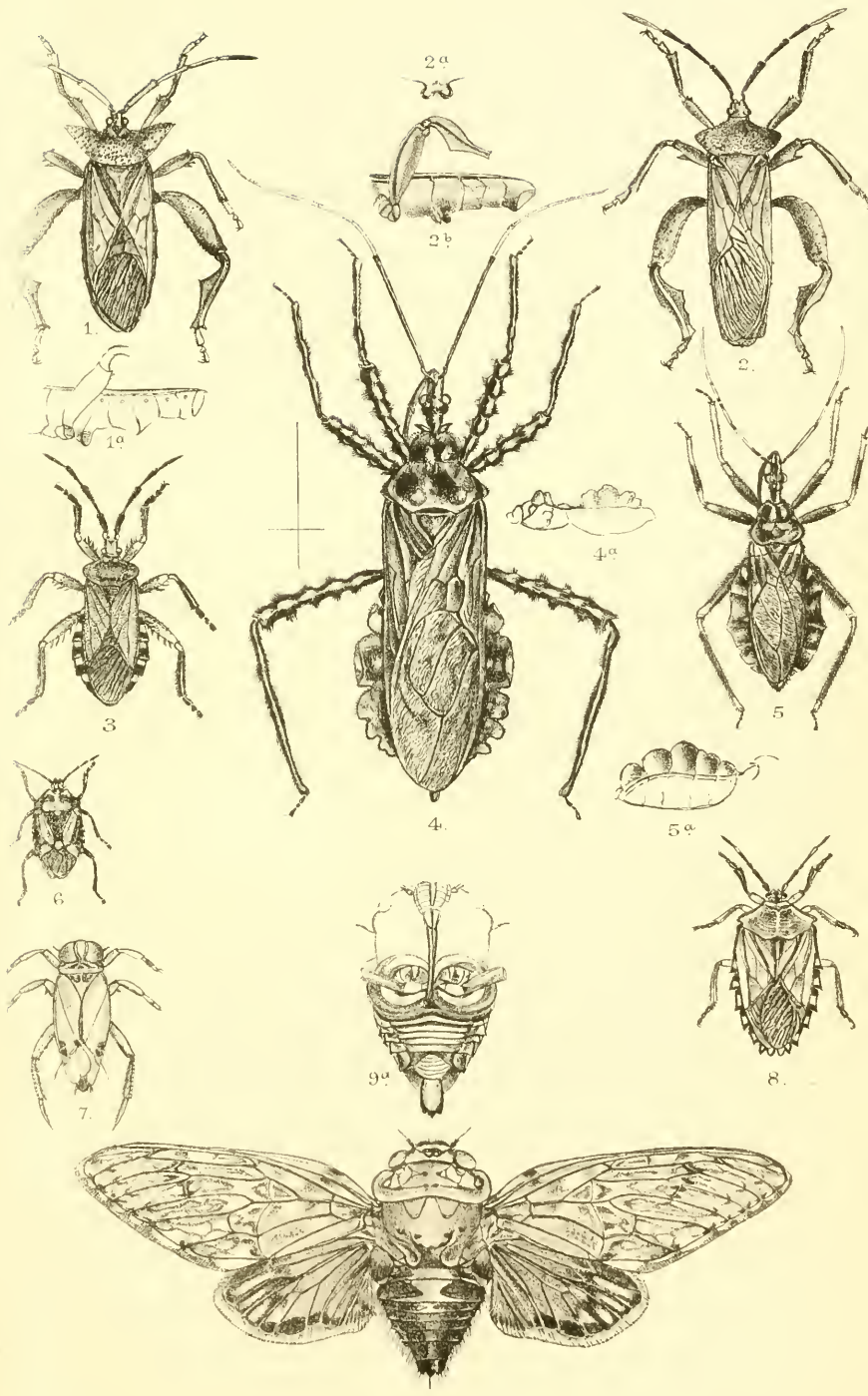














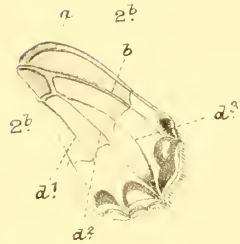
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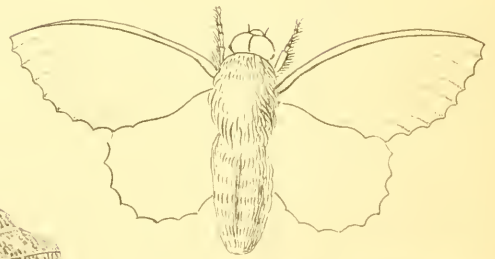
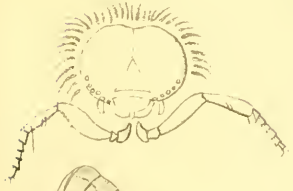
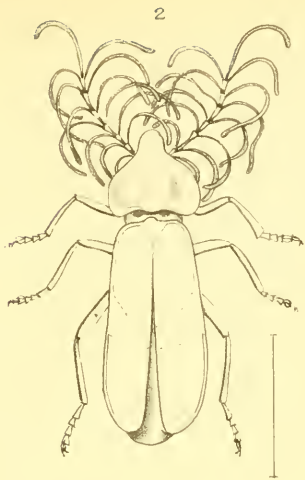
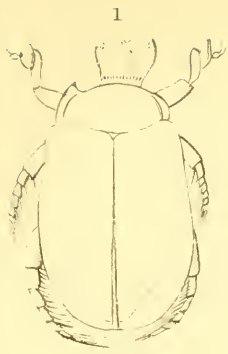
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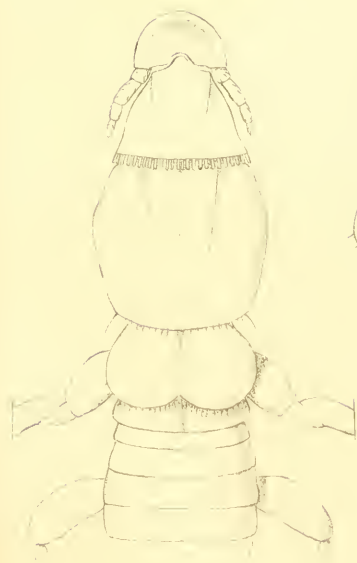
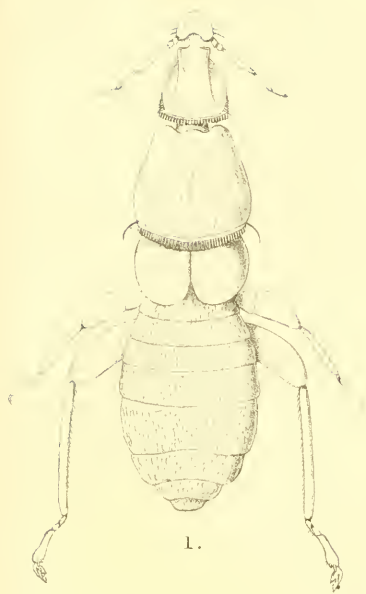




1. *Papilio Sangra*  
2. *Euploea Depuiseti*

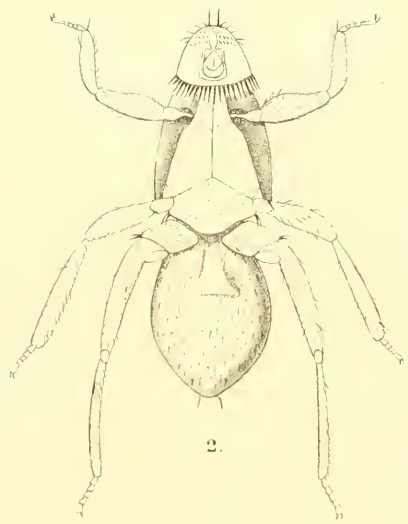
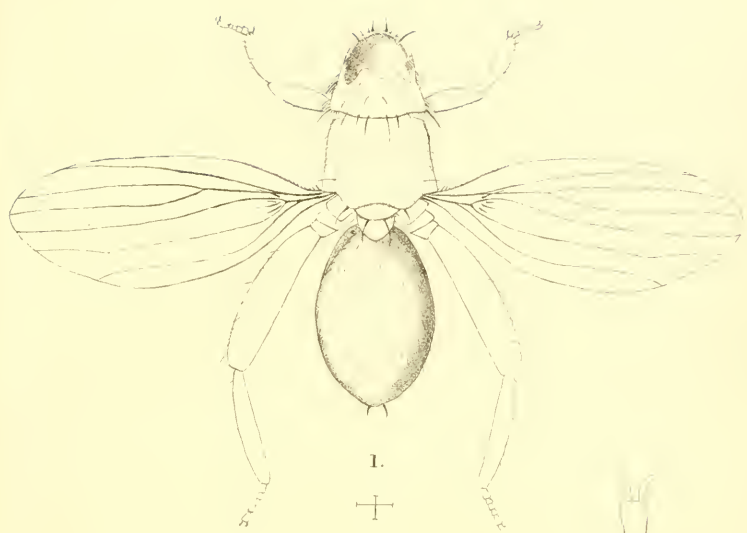
3. *Limenitis Brugni*  
4. *Cyrestes Eximia*





1 & 2. *Polycytenes tyræ*  
3 & 4. *Polycytenes spasma*











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