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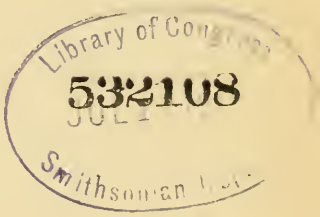

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CONTENTS.

MEMOIRS.

EXPLANATION OF PLATES, TRANSACTIONS.

PROCEEDINGS.

List of Fellows

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON.

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1914 Lameere, Professor A., *Bruxelles.*
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1893 Wattenwyl, Hoffrath Carl Brunner von, *Schönburgstrasse 3, Vienna.*
1898 * Weismann, Dr. August, *Freiburg, Baden.*

FELLOWS.

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1877 Adams, Frederick Charlstrom, F.Z.S., 50, *Ashley-gardens, Victoria-street,* S.W.
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1885 Adkin, Robert, (Council, 1901–2, 1911–13), *Wellfield, Lingards-road, Lewisham,* S.E.
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1899 † Arrow, Gilbert J., (Council, 1905–7), 87, *Union-grove, Clapham,* S.W.; and *British Museum (Natural History), Cromwell-road,* S.W.
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1907 † Ashby, Sydney R., 119, *Greenvale-road, Eltham-park, Kent.*
1886 Atmore, E. A., 48, *High-street, King's Lynn.*
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1912 Carter, Henry Francis, Assistant Lecturer and Demonstrator in Medical and Economic Entomology, *Liverpool School of Tropical Medicine, University of Liverpool.*

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1906 Dukinfield Jones, E., *Castro*, *Reigate*.

1883 Durrant, John Hartley, (V.-Pres., 1912–13; Council, 1911–13), *Merton*, 17, *Burstock-road*, *Putney*, S.W., and *British Museum (Natural History)*, *Cromwell-road*, *South Kensington*, S.W.

1910 Eales-White, J. Cushny, 47, *Chester-terrace*, *Eaton-square*, S.W.

1912 Earl, Herbert L., M.A., 35, *Leicester-street*, *Southport*, *Lancs*.

1890 Eastwood, John Edmund, *Gosden House*, *Guildford*.

1865 Eaton, The Rev. Alfred Edwin, M.A., (Council, 1877–9), *Richmond Villa*, *Northam S.O.*, *N. Devon*.

1904 Eckford, George, F.Z.S., c/o Sir Morgan Tuite, Bart., *Kilruane*, *Nenagh*, *Co. Tipperary*, *Ireland*.

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1886 Edwards, James, *Colesborne*, *Cheltenham*.

1884 Edwards, Stanley, F.L.S., F.Z.S., (Council, 1912–), 15, *St. Germans-place*, *Blackheath*, S.E.

1913 Edwards, William H., *Natural History Dept.*, *The Museum*, *Birmingham*.

1900 Elliott, E. A., 16, *Belsize Grove*, *Hampstead*, N.W.

1900 Ellis, H. Willoughby, *Holly Hill*, *Berkswell*, *Warwickshire*.

1886 Ellis, John W., M.B., L.R.C.P., 18, *Rodney-street*, *Liverpool*.

1903 Eltringham, Harry, M.A., D.Sc., F.Z.S., Vice-President, (Council, 1913–), *Woodhouse*, *Stroud*, *Gloucestershire*, and *Hope Department*, *University Museum*, *Oxford*.

1878 Elwes, Henry John, J.P., F.R.S., F.L.S., F.Z.S., (Pres., 1893–4; V.-Pres., 1889–90, 1892, 1895; Council, 1888–90), *Colesborne*, *Cheltenham*.

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1886 Enock, Frederick, F.L.S., 13, *Tufnell Park Road*, *London*, N.

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1861 Fenn, Charles, *Eversden House, Burnt Ash Hill, Lee*, S.E.
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1896 Freke, Percy Evans, *Southpoint, Limes-road, Folkestone.*
1888 Fremlin, H. Stuart, M.R.C.S., L.R.C.P., *The Elms, Kingsbury*, N.W.
1903 French, Charles, F.L.S., Government Entomologist, *Melbourne, Victoria, Australia.*
1910 Frisby, G. E., 40, *Windmill-street, Gravesend.*
1908 Froggatt, Walter W., F.L.S., Government Entomologist, 138, *George-street, Sydney, New South Wales.*
1891 Frohawk, F. W., *Stanley House, Park-road, Wallington, Surrey.*
1906 † Fry, Harold Armstrong, *P.O. Box* 46, *Johannesburg, Transvaal Colony.*
1900 Fryer, H. Fortescue, *The Priory, Chatteris, Cambs.*
1907 Fryer, John Claud Fortescue, *Artillery Mansions, Victoria-street*, S.W., and *The Priory, Chatteris, Cambs.*
1876 Fuller, The Rev. Alfred, M.A., *The Lodge*, 7, *Sydenham-hill, Sydenham*, S.E.
1898 Fuller, Claude, Government Entomologist, *Pietermaritzburg, Natal.*

1887 Gahan, Charles Joseph, M.A., (Sec., 1899–1900 ; Council, 1893–5, 1901, 1914–), 8, *Lonsdale-road, Bedford Park*, W. ; and *British Museum* (*Natural History*), *Cromwell-road*, S.W.

1910 Garcke, Emile, M.I.E.E., *Witton House, Maidenhead.*

1890 Gardner, John, *Laurel Lodge, Hart, West Hartlepool.*

1901 † Gardner, Willoughby, F.L.S., *Deganwy, N. Wales.*

1913 de Gaye, J. A., *King's College, Lagos, S. Nigeria.*

1899 Geldart, William Martin, M.A., 10, *Chadlington-road, Oxford.*

1913 Gibb, Lachlan, 38, *Blackheath Park, Blackheath, S.E.*

1906 † Gibbs, Arthur Ernest, F.L.S., F.Z.S., (Council, 1912–), *Kitchener's Meads, St. Albans.*

1908 Giffard, Walter M., *P.O. Box* 308, *Honolulu, Hawaii.*

1907 Giles, Henry Murray, Head Keeper of Zoological Gardens, *South Perth, W. Australia.*

1902 Gillanders, A. T., *Park Cottage, Alnwick.*

1904 Gilliat, Francis, B.A., *Combe House, Balcombe, Sussex.*

1914 Godfrey, E. J., Education Dept., *Bangkok, Siam.*

1865 † Godman, Frederick Du Cane, D.C.L., F.R.S., F.L.S., F.Z.S., (Pres., 1891–2 ; V.-Pres., 1882-3, 1886, 1889–90, 1902 ; Council, 1880–1, 1900), *South Lodge, Lower Beeding, Horsham* ; and 45, *Pont street*, S.W.

1886 † Goodrich, Captain Arthur Mainwaring, *Brislington House, near Bristol.*

1904 Goodwin, Edward, *Canon Court, Wateringbury, Kent.*

1898 Gordon, J. G. McH., *Corsemalzie, Whauphill S.O., Wigtownshire.*

1898 Gordon, R. S. G. McH., *Corsemalzie, Whauphill S.O., Wigtownshire.*

1855 Gorham, The Rev. Henry Stephen, F.Z.S., (Council, 1882–3), *Highcroft, Great Malvern.*

1913 Gough, Lewis, Ph.D., Entomologist to the Govt. of Egypt, *Dept. of Agriculture, Cairo.*

1909 Gowdey, Carlton C., B.Sc., c/o Dr. A. Gowdey, *The Grange, Maitland Park, Haverstock Hill*, N.W.

1914 Graveley, F. H., *The Indian Museum, Calcutta.*

1911 Graves, P. P., *Turf Club, Cairo, Egypt.*

1891 † Green, E. Ernest, F.Z.S., (Council, 1914–), *Way's End, Beach-avenue, Camberley.*

1910 Green, Herbert A., *The Central Fire Station, Durban, Natal.*

1894 Green, J. F., F.Z.S., 38, *Pont-street, London, S.W.*

1898 Greenshields, Alexander, 38, *Blenheim-gardens, Cricklewood*, N.W.

1893 † Greenwood, Henry Powys, F.L.S., *Whitsbury House, Salisbury.*

1888 Griffiths, G. C., F.Z.S., *Penhurst*, 3, *Leigh-road, Clifton, Bristol.*

1894 Grimshaw, Percy H., *Royal Scottish Museum, Edinburgh.*

1905 Grist, Charles J., *Elgin House, Knockholt, Sevenoaks.*

1906 Gurney, Gerard H., *Keswick Hall, Norwich.*

1910 Gurney, William B., Asst. Govt. Entomologist, *Department of Agriculture, Sydney, Australia.*

1912 Hacker, Henry, *Bowen Bridge-road, Brisbane, Queensland.*
1906 Hall, Arthur, 7, *Park-lane-mansions, Croydon.*
1890 † Hall, Albert Ernest, *Cranfield House, Southwell, Notts.*
1885 Hall, Thomas William, *Stanhope, The Crescent, Croydon.*
1912 Hallett, Howard Mountjoy, 64, *Westbourne-road, Penarth, Glamorganshire.*
1898 Hamlyn-Harris, R., D.Sc., F.L.S., F.Z.S., F.R.M.S., Director of the Queensland Museum, *Brisbane, Australia.*
1891 Hampson, Sir George Francis, Bart., B.A., F.Z.S., (V.-Pres., 1898 ; Council, 1896–8), 62, *Stanhope-gardens*, S.W.
1891 Hanbury, Frederick J., F.L.S., *Brockhurst, E. Grinstead.*
1905 † Hancock, Joseph L., 5454, *University-avenue, Chicago, U.S.A.*
1903 Hare, E. J., 4, *New-square, Lincoln's Inn*, W.C.
1904 Harris, Edward, *St. Conan's, Chingford, Essex.*
1910 Harwood, Philip, 23, *Northgate End, Bishop's Stortford.*
1910 Hawkshaw, J. C., *Hollycombe, Sussex.*
1913 † Hawkshaw, Oliver, 3, *Hill-street, Mayfair*, W.
1910 Hedges, Alfred van der, *Stoke House, Stoke Mandeville, Bucks.*
1910 Henderson, J., c/o Messrs. Osborne & Chappel, *Ipoh, Perak, Federated Malay States.*
1898 Heron, Francis A., B.A., 9, *Park House, Highbury Park*, N.
1903 Herrod-Hempsall, William, *W.B.C. Apiary, Old Bedford-road, Luton, Beds.*
1908 Hewitt, C. Gordon, D.Sc., Dominion Entomologist, *Dept. of Agriculture, Ottawa, Canada.*
1913 Hewitt, John, B.A., Director, *Albany Museum, Grahamstown, S. Africa.*
1913 Hill, Gerald F., Govt. Entomologist, *Port Darwin, Northern Territory, South Australia.*
1876 † Hillman, Thomas Stanton, *Eastgate-street, Lewes.*
1907 Hoar, Thomas Frank Partridge, *Mercia, Albany-road, Leighton Buzzard.*
1914 Hodge, The Rev. Prebendary Edward Grose, *The Vicarage Paddington.*
1912 Hodge, Harold, *St. James' Mansions*, 54, *Piccadilly*, W.
1888 Hodson, The Rev. J. H., B.A., B.D., *Rhyddington, Clifton Drive, Lytham.*
1902 Hole, R. S., c/o Messrs. King and Co., *Bombay.*
1910 Holford, H. O., *Elstead Lodge, Godalming, Surrey.*
1887 Holland, The Rev. W. J., D.D., Ph.D., *5th Avenue, Pittsburg, Penn., U.S.A.*
1898 Holman-Hunt, C. B., Asst. Entomologist, Department of Agriculture, *Kuala Lumpur, Federated Malay States.*
1910 Holmes, Edward Morrell, *Ruthven, Sevenoaks.*
1901 Hopson, Montagu F., L.D.S., R.C.S.Eng., F.L.S., 64, *Harley-street*, W.
1897 Horne, Arthur, 60, *Gladstone-place, Aberdeen.*

1903 Houghton, J. T., 1, *Portland-place, Worksop.*
1907 † Howard, C. W., Entomological Division, *College of Agriculture, St. Anthony Park, Minn., U.S.A.*
1900 Howes, W. George, 432, *George-street, Dunedin, New Zealand.*
1907 Howlett, Frank M., M.A., *Wymondham, Norfolk.*
1865 † Hudd, A. E., 108, *Pembroke-road, Clifton, Bristol.*
1888 Hudson, George Vernon, *Hill View, Karori, Wellington, New Zealand.*
1914 Hudson, H. Baldwin, *The Ferns, Upper Highway, Kings Langley, Herts.*
1907 Hughes, C. N., 3, *Wyndham Place, Bryanston-square,* W.
1912 Huie, Miss Lily, *Hollywood, Colinton-road, Edinburgh.*

1897 Image, Prof. Selwyn, M.A., (Council, 1909–11), 20, *Fitzroy-street, Fitzroy-square,* W.
1912 † Imms, A. D., D.Sc., B.A., F.L.S., *Entomological Dept., The University, Manchester.*
1908 Irby, Major Leonard Paul, *Evington-place, Ashford, Kent.*
1891 Isabell, The Rev. John, *Sunnycroft, St. Sennen S.O., Cornwall.*

1907 Jack, Rupert Wellstood, Government Entomologist, Department of Agriculture, *Salisbury, Rhodesia.*
1907 Jackson, P. H., 112, *Balham-park-road,* S.W.
1907 Jacobi, Professor A., Ph.D., Director of the R. Zoological and Anthrop.-Ethnographical Museum, *Dresden, Saxony.*
1911 Jacobs, Capt. J. J., R.E., *Framsden, Tring, Herts.*
1910 Jacobs, Lionel L., *P.O. Box* 445, *Sault Ste. Marie, Ontario, Canada.*
1914 Jannings, Rev. Frederic S. F., *Warmsworth Rectory, Doncaster.*
1914 Janse, A. J. T., 1*st-street, Gezina, Pretoria, S. Africa.*
1869 Janson, Oliver E., *Cestria, Claremont-road, Highgate,* N.; and 44, *Great Russell-street, Bloomsbury,* W.C.
1898 Janson, Oliver J., *Cestria, Claremont-road, Highgate,* N.
1912 Jardine, Nigel K., *Le Syndicat des Fabricants de Sucre, L'Isle de Réunion.*
1912 Jemmett, C., *Withersdane House, Wye, Kent.*
1886 Jenner, James Herbert Augustus, *East Gate House, Lewes.*
1899 Jennings, F. B., 152, *Silver-street, Upper Edmonton,* N.
1909 Jepson, Frank P., *Department of Agriculture, Suva, Fiji Islands.*
1886 John, Evan, *Llantrisant S.O., Glamorganshire.*
1907 Johnson, Charles Fielding, *West Bank, Didsbury-road, Heaton Mersey.*
1889 Johnson, The Rev. W. F., M.A., *Acton Rectory, Poyntz Pass, co. Armagh.*
1908 Joicey, James J., *The Hill, Witley, Surrey.*
1888 Jones, Albert H., (V.-Pres., 1912, Council, 1898–1900; Treasurer, 1904–), *Shrublands, Eltham,* S.E.

1894 † Jordan, Dr. K., (V.-Pres., 1909; Council, 1909–11), *The Museum, Tring.*
1910 Joseph, E. G., 23, *Clanricarde-gardens*, W.
1910 Joy, Ernest Cooper, *Eversley, Dale-road, Purley.*
1902 Joy, Norman H., M.R.C.S., L.R.C.P., *Bradfield, Reading.*
1913 Junk, Wilhelm, 68, *Sachsische-strasse, Berlin*, W. 15.

1884 Kappel, A. W., F.L.S., *Linnean Society, Burlington House*, W.
1876 † Kay, John Dunning, *Leeds.*
1896 † Kaye, William James, (Council, 1906–8), *Caracas, Ditton Hill, Surbiton.*
1907 Kelly, Albert Ernest McClure, Division of Entomology, Department of Agriculture, *Pretoria, S. Africa.*
1890 Kenrick, Sir George H., *Whetstone, Somerset-road, Edgbaston, Birmingham.*
1904 Kershaw, G. Bertram, *Ingleside, West Wickham, Kent.*
1906 Keynes, John Neville, M.A., D.Sc., 6, *Harvey-road, Cambridge.*
1900 Keys, James H., 7, *Whimple-street, Plymouth.*
1911 Khunan, Kunui, M.A., Asst. Entomologist to the Govt. of Mysore, *Bangalore, South India.*
1912 King, Harold H., Govt. Entomologist, *Gordon College, Khartoum, Sudan.*
1889 King, James J. F.-X., 1, *Athole Gardens-terrace, Kelvinside, Glasgow.*
1913 Kirby, W. Egmont, M.D., *Hilden*, 46, *Sutton Court-road, Chiswick*, W.
1889 Klapálek, Professor Franz, *Karlín* 263, *Prague, Bohemia.*
1887 † Klein, Sydney T., F.L.S., F.R.A.S., *Hatherlow, Raglan-road, Reigate.*

1910 Lakin, C. Ernest, M.D., F.R.C.S., 2, *Park-crescent, Portland-place*, W.
1911 † Lamborn, W. A., M.R.C.S., L.R.C.P., *Zomba, Nyasaland, E. Africa.*
1868 Lang, Colonel A. M., C.B., R.E., *Box Grove Lodge, Guildford.*
1912 Latour, Cyril Engelhart, *Port of Spain, Trinidad, British West Indies.*
1895 Latter, Oswald H., M.A., *Charterhouse, Godalming.*
1899 Lea, Arthur M., Government Entomologist, *Museum, Adelaide, S. Australia.*
1914 Leechman, Alleyne, M.A., F.L.S., F.C.S., *Corpus Christi College, Oxford*, and *St. Hubert's, Main-street, Georgetown, British Guiana.*
1901 Leigh, George F., 45, *Cuthbert's Buildings, West-street, Durban, Natal.*
1910 Leigh, H. S., *The University, Manchester.*
1909 Leigh-Clare, Reginald L., *Golf Club, Hadley, Barnet.*
1900 Leigh-Phillips, Rev. W. J., *Burtle Vicarage, Bridgwater.*

1903 † Levett, The Rev. Thomas Prinsep, *Frenchgate, Richmond, Yorks.*
1876 Lewis, George, F.L.S., (Council, 1878, 1884), 30, *Shorncliffe-road, Folkestone.*
1908 † Lewis, John Spedan, *Grove Farm, Greenford Green, South Harrow,* and 277, *Oxford-street,* W.
1892 Lightfoot, R. M., *Bree-st., Cape Town, Cape of Good Hope.*
1914 Lister, J. J., *St. John's College, Cambridge,* and *Merton House, Grantchester.*
1908 Lister, W. K., *Street End House, Ash, near Dover.*
1903 Littler, Frank M., *Box* 114, *P.O., Launceston, Tasmania.*
1865 † Llewelyn, Sir John Talbot Dillwyn, Bart., M.A., F.L.S., *Penllergare, Swansea.*
1881 † Lloyd, Alfred, F.C.S., *The Dome, Bognor.*
1885 † Lloyd, Robert Wylie, (Council, 1900–1), I, 5 and 6, *Albany, Piccadilly,* W.
1903 Lofthouse, Thomas Ashton, *The Croft, Linthorpe, Middlesbrough.*
1908 Longsdon, D., *The Flower House, Southend, Catford,* S.E.
1904 † Longstaff, George Blundell, M.D., (V.-Pres., 1909; Council, 1907–9), *Highlands, Putney Heath,* S.W.
1899 Lounsbury, Charles P., B.Sc., Government Entomologist, *Box* 513 *Pretoria, S. Africa.*
1894 Lowe, The Rev. Frank E., M.A., *St. Stephen's Vicarage, Guernsey.*
1893 Lower, Oswald B., *Argent-street, Broken Hill, New South Wales.*
1901 Lower, Rupert S., *Davenport-terrace, Wayville, South Australia.*
1909 Lucas, Dr. T. P., *Wakefield-buildings, Adelaide-street, Brisbane, Australia.*
1898 Lucas, William John, B.A., (Council, 1904–6), 28, *Knight's Park, Kingston-on-Thames.*
1880 Lupton, Henry, *Courtlands, Chelston, Torquay.*
1903 Lyell, G., *Gisborne, Victoria, Australia.*
1912 Lyle, George Trevor, *Bank House, Brockenhurst.*
1901 * Lyman, Henry H., M.A., F.R.G.S., 474, *St. Paul-street, Montreal, Canada.*
1909 Lyon, Francis Hamilton, 89, *Clarence Gate-gardens, Upper Baker-street,* N.W.

1887 M'Dougall, James Thomas, *Dunolly, Morden-road, Blackheath,* S.E.
1910 Macdougall, R. Stewart, M.A., D.Sc., F.R.S.E., *Edinburgh University.*
1900 Mackwood, The Hon. F. M., M.L.C., *Colombo, Ceylon.*
1899 † Main, Hugh, B.Sc., (Council, 1908–10), *Almondale, Buckingham-road, South Woodford,* N.E.
1914 Mallock, J. Russell, State Entomologist's Office, *Urbana, Illinois, U.S.A.*
1905 Mally, Charles Wm., M.Sc., *Dept. of Agriculture, Cape Town, S. Africa.*

1887 Manders, Col. Neville, A.M.S., D.D.M.S., F.Z.S., *Army of Occupation Headquarters, Cairo, Egypt.*
1892 Mansbridge, William, 4, *Norwich-road, Wavertree, Liverpool.*
1894 † Marshall, Alick, 18, *Hazeldene-road, Chiswick, W.*
1895 Marshall, Guy Anstruther Knox, F.Z.S., (Council, 1907–8), 6, *Chester-place, Hyde Park-square,* W.
1896 Marshall, P., M.A., B.Sc., F.G.S., *University School of Mines, Dunedin, New Zealand.*
1856 † Marshall, William, V.M.H., F.R.H.S., *Auchinraith, Bexley S.O., Kent.*
1897 Martineau, Alfred H., 54, *Holly-lane, W. Smethwick.*
1910 † Mason, C. W., *St. Denis, Shaftesbury, Dorset.*
1913 Mason, Lowell, 22 and 23, *Club Arcade, Durban, Natal.*
1895 Massey, Herbert, *Ivy-Lea, Burnage, Didsbury, Manchester.*
1865 Mathew, Gervase F., F.L.S., Paymaster-in-chief, R.N., (Council, 1887), *Lee House, Dovercourt, Harwich.*
1887 Matthews, Coryndon, *Stentaway, Plymstock, S. Devon.*
1912 Maulik, Samarenda, c/o Messrs. T. Cook & Son, *Ludgate-circus,* E.C., and *Fitzwilliam Hall, Cambridge.*
1900 Maxwell-Lefroy, H., *Imperial College of Science and Technology, South Kensington,* S.W.
1904 Meade-Waldo, Geoffrey, M.A., (Council, 1914–), *Hever Warren, Edenbridge, Kent,* and *British Museum (Natural History) Cromwell-road,* S.W.
1913 Meaden, Louis, *Melbourne, Dyke-road, Preston, Brighton.*
1872 † Meldola, Professor Raphael, Hon. D.Sc. Oxon, Hon. LL.D. St. Andrews, F.R.S., F.C.S., F.I.C., F.R.A.S., etc. (Pres., 1895–6 ; V.-Pres., 1881, 1884, 1897, 1903, 1908 ; Sec., 1876–80 ; Council, 1874–5, 1884–5, 1889–92, 1903, 1907–8), 6, *Brunswick-square,* W.C.
1885 Melvill, James Cosmo, M.A., F.L.S., *Meole Brace Hall, Shrewsbury.*
1914 Menon, J. R., B.A., *Trichur, Cochin State, S. India.*
1887 Merrifield, Frederic, (Pres., 1905–6 ; V.-Pres., 1893, 1907 ; Sec., 1897–8 ; Council, 1894, 1899), 14, *Clifton-terrace, Brighton.*
1905 Merry, Rev. W. Mansell, M.A., *St. Michael's, Oxford.*
1912 Metcalfe, Rev. J. W., *The Vicarage, Ottery St. Mary, Devon.*
1880 Meyrick, Edward, B.A., F.R.S., F.Z.S., *Thornhanger, Marlborough.*
1894 Miall, Louis Compton, F.R.S., (Council, 1903, 1908), *Norton Way N., Letchworth.*
1908 Middleton, Ivan E., *Plevna House, Mussoorie, U. P., India.*
1883 Miles, W. H., c/o E. Step, Esq., *Oakwood House, Ashstead, Surrey.*
1913 Miller, F. V. Bruce, *Livingston, N. Rhodesia, Africa.*
1905 Mitford, Robert Sidney, C.B., *Thornlea, Weybridge.*
1914 Miyaké, Dr. Tsunekata, *The Agricultural College, Tokyo Imperial University, Komaba, Tokyo, Japan.*
1879 Monteiro, Dr. Antonio Augusto de Carvalho, 70, *Rua do Alecrinar, Lisbon.*

1902 Montgomery, Arthur Meadows, 34, *Shalimar Gardens, Pembridge-road, North Acton*, W.
1899 Moore, Harry, 12, *Lower-road, Rotherhithe.*
1907 Moore, Mrs. Catharine Maria, *Greyscliff, Newquay, Cornwall.*
1886 Morgan, A. C. F., F.L.S., 135, *Oakwood-court, Kensington*, W.
1889 † Morice, The Rev. F. D., M.A., Fellow of Queen's College, Oxford, (Pres., 1911, 1912, V.-Pres., 1902, 1904, 1913; Council, 1902–4), *Brunswick, Mount Hermon, Woking.*
1895 † Morley, Claude, F.Z.S., *Monk Soham House, Suffolk.*
1912 Morrell, R. D'A., *Authors' Club*, 1, *Whitehall-court*, S.W.
1907 Mortimer, Charles H., *Royton Chase, Byfleet, Surrey.*
1893 Morton, Kenneth J., 13, *Blackford-road, Edinburgh.*
1910 Mosely, Martin E., 21, *Alexandra-court, Queen's-gate*, S.W.
1900 Moser, Julius, 59, *Bulow-strasse, Berlin.*
1882 Mosley, S. L., *The Museum and Technical College, Huddersfield.*
1911 Moss, Rev. A. Miles, *Helm, Windermere.*
1907 † Moulton, John C., *Sarawak Museum, Sarawak.*
1911 Mounsey, J. Jackson, 24, *Glencairn-crescent, Edinburgh.*
1901 † Muir, Frederick, *H.S.P.A. Experiment Station, Honolulu, Oahu, H.T.*
1912 † Mullan, Jal Phirozshah, M.A., F.L.S., F.Z.S., Assistant Professor of Biology, *Lamington-road, Bombay, India.*
1869 † Müller, Albert, F.R.G.S., (Council, 1872–3), c/o Herr A. Müller-Mechel, *Grenzacherstrasse* 60, *Basle, Switzerland.*
1914 Murray, George W., *Dirimu Estate, Binaturi River, Daru, Papua.*
1906 Muschamp, Percy A. H., *Institut, Stüfa*, nr. *Zurich, Switzerland.*
1909 Musham, John F., 48, *Brook-street, Selby, Yorks.*

1903 Neave, S. A., B.A., *Mill Green Park, Ingatestone.*
1901 Nevinson, E. B., *Morland, Cobham, Surrey.*
1907 Newman, Leonard Woods, *Bexley, Kent.*
1913 Newman, Leslie John William, *Dept. of Agriculture, Perth, W. Australia.*
1909 Newstead, Alfred, *The Grosvenor Museum, Chester.*
1890 Newstead, Robert, M.Sc., A.L.S., Hon. F.R.H.S., Dutton Memorial Professor of Entomology, *The School of Tropical Medicine, University of Liverpool.*
1914 Nicholson, Charles, 35, *The Avenue, Hale-end, Chingford*, N.E.
1909 Nicholson, Gilbert W., M.A., M.D., (Council, 1913–), *Oxford and Cambridge Club, Pall Mall*, S.W.
1886 Nicholson, William E., *School Hill, Lewes.*
1906 Nix, John Ashburner, *Tilgate, Crawley, Sussex.*
1912 Noakes, Alfred, *The Hill, Witley, Surrey.*
1914 Norris, Frederic de la Mare, *The Agricultural Department, Kuala Lumpur, Malay States.*
1878 Nottidge, Thomas, *Ashford, Kent.*
1895 Nurse, Lt.-Colonel C. G., *Timworth Hall, Bury St. Edmunds.*

1908 Nurse, H. A., *Education Department, Trinidad, B.W.I.*

1877 Oberthür, René, *Rennes (Ille-et-Vilaine), France.*
1893 † Ogle, Bertram S., *Steeple Aston, Oxfordshire.*
1910 Oldaker, Francis A., M.A., *The Red House, Haslemere.*
1873 * Olivier, Ernest, *Ramillons, près Moulins (Allier), France.*
1913 Ormiston, Walter, *Kalupahani, Haldumille, Ceylon.*

1895 Page, Herbert E., *Bertrose, Gellatly-road, St. Catherine's Park,* S.E.
1912 Paterson, Edward J., *Fairholme, Crowborough.*
1913 Peacock, Alexander David, 137, *Wingrove-gardens,* and *Armstrong College, Newcastle-on-Tyne.*
1907 Pead, Clement H., *Box* 252, *Bulawayo, South Africa.*
1911 Pearson, Douglas, *Chilwell House, Chilwell, Notts.*
1914 Pendlebury, Wm. J. von Monté, *Broadlands, Shrewsbury,* and *Keble College, Oxford.*
1883 Péringuey, Louis, D.Sc., F.Z.S., Director, *South African Museum, Cape Town, South Africa.*
1903 † Perkins, R. C. L., M.A., D.Sc., F.Z.S., *Park Hill House, Paignton, Devon,* and Board of Agriculture, Division of Entomology, *Honolulu, Hawaii.*
1879 Perkins, Vincent Robert, *Wotton-under-Edge.*
1907 † Perrins, J. A. D., 3rd Seaforth Highlanders, *Davenham, Malvern.*
1897 Phillips, Capt. Hubert C., M.R.C.S., L.S.A., 37, *Princes-square, Bayswater,* W.
1903 † Phillips, Montagu A., F.R.G.S., F.Z.S., *Devonshire House Preparatory School, Reigate.*
1891 Pierce, Frank Nelson, 1, *The Elms, Dingle, Liverpool.*
1903 Pilcher, Colonel Jesse George, I.M.S., F.R.C.S., 133, *Gloucester-road, Kensington,* S.W.
1910 Pillai, A. Raman, *University Union, Edinburgh,* and *Trivandrum, India.*
1913 Platt, Ernest Edward, 403, *Essenwood-road, Durban, Natal.*
1885 Poll, J. R. H. Neerwort van der, *Driebergen, Netherlands.*
1870 † Porritt, Geo. T., F.L.S., (Council, 1887), *Elm Lea, Dalton, Huddersfield.*
1913 Porter, Prof. Carlos, C.M.Z.S., Professor of Zoology, *Agricultural Institute, Santiago, Chile.*
1884 † Poulton, Professor Edward B., D.Sc., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., Hope Professor of Zoology in the University of Oxford, (Pres., 1903–4 ; V.-Pres., 1894–5, 1902, 1905 ; Council, 1886–8, 1892, 1896, 1905–7), *Wykeham House, Banbury-road Oxford.*
1905 Powell, Harold, 7, *Rue Mireille, Hyères (Var), France.*
1906 Pratt, H. C., Government Entomologist Federated Malay States, *Kuala Lumpur, Malay States.*

1908 Pratt, William B., 10, *Lion Gate Gardens, Richmond, Surrey.*
1878 Price, David, 48, *West-street, Horsham.*
1908 Prideaux, Robert M., *Woodlands, Brasted Chart, Sevenoaks.*
1904 Priske, Richard A. R., 9, *Melbourne Avenue, West Ealing.*
1893 Prout, Louis Beethoven, (Council, 1905–7), 84, *Albert-road, Dalston*, N.E.
1910 Punnett, Professor Reginald Crundall, M.A., *Caius College, Cambridge.*

1900 Rainbow, William J., *The Australian Museum, Sydney, N.S.W.*
1912 Rait-Smith, W., 86, *Gladstone-street, Abertillery, Monmouthshire.*
1913 Rao, H. Ananthaswamy, *Curator of the Government Museum, Bangalore, India.*
1907 Rayward, Arthur Leslie, *Rockford, Beechwood-road, Sanderstead.*
1893 Reid, Captain Savile G., late R.E., *The Elms, Yalding, Maidstone.*
1898 Relton, R. H., c/o Perkins and Co., Ltd., *Brisbane, Queensland.*
1898 Reuter, Professor Enzio, *Helsingfors, Finland.*
1910 de Rhé-Philipe, G. W. V., c/o Grindlay & Co., *Hastings-street, Calcutta.*
1912 Riley, Norman Denbigh, 94, *Drakefield-road, Upper Tooting*, S.W., and *British Museum (Natural History), S. Kensington*, S.W.
1908 Rippon, Claude, M.A., 28, *Walton-street, Oxford.*
1905 Robinson, Herbert C., *Curator of State Museum, Kuala Lumpur, Selangor.*
1904 Robinson, Lady, *Worksop Manor, Notts.*
1892 Robinson, Sydney C., 10, *Inchmory-road, Catford*, S.E.
1869 † Robinson-Douglas, William Douglas, M.A., F.L.S., F.R.G.S., *Orchardton, Castle Douglas.*
1908 Rogers, The Rev. K. St. Aubyn, M.A., Church Missionary Society, *Mombasa, British East Africa.*
1886 Rose, Arthur J., 1, *Harewood-road, S. Croydon.*
1912 Rosen, Kurt, Baron, *Zoologische Staatssammlung, Munich.*
1907 Rosenberg, W. F. H., 57, *Haverstock-hill*, N.W.
1868 Rothney, George Alexander James, *Pembury, Tudor-road, Upper Norwood*, S.E.
1894 † Rothschild, The Honble. Nathaniel Charles, M.A., F.L.S., F.Z.S., Vice-President, (Council, 1904, 1913–), *Arundel-house, Kensington Palace Gardens*, W.
1888 † Rothschild, The Honble. Walter, D.Sc., F.R.S., F.L.S., F.Z.S., (Council, 1900), *Zoological Museum, Tring.*
1890 Routledge, G. B., *Tarn Lodge, Heads Nook, Carlisle.*
1913 Rowden, Alfred Oliver, 3, *Archibald-road, Exeter.*
1887 Rowland-Brown, Henry, M.A., (V.-Pres., 1908, 1910; Sec., 1900–10; Council, 1914–), *Oxhey-grove, Harrow Weald.*
1910 Rudge, Charles Henry, 27, *Goldhurst-terrace, S. Hampstead*, N.W
1898 Russell, A., *Wilverley, Dale-road, Purley.*
1892 Russell, S. G. C., 19, *Lombard-street*, E.C.

1905 St. Quintin, W. H., *Scampton Hall, Rillington, York.*
1906 Sampson, Lt.-Colonel F. Winn, 74, *Vineyard Hill-road, Wimbledon Park.*
1910 Saunders, H. A., *Brookfield-house, Swanage.*
1901 Schaus, W., F.Z.S., *U.S. National Museum, Washington, D.C., U.S.A.*
1907 Schmassmann, W., *Beulah Lodge, London-road, Enfield,* N.
1912 Schunck, Charles A., *Ewelme, Wallingford.*
1881 Scollick, A. J., 8, *Elmswood, Malden-road, New Malden.*
1911 Scorer, Alfred George, *Hill Crest, Chilworth, Guildford.*
1909 Scott, Hugh, B.A., *University Museum of Zoology, Cambridge.*
1911 Scott, Percy William Affleck, Chinese Imperial Customs Service, *Hangchow, China.*
1912 Seitz, Dr. Adalbert, 59, *Bismarckstrasse, Darmstadt, Germany.*
1911 Selous, Cuthbert F., M.D., M.R.C.S., L.R.C.P., *Agra, Barton-on-Sea, New Milton, Hants.*
1911 † Sennett, Noel Stanton, 32, *Bolton-gardens, S. Kensington,* S.W.
1862 Sharp, David, M.A., M.B., F.R.S., F.L.S., F.Z.S., (Pres., 1887–8 ; V.-Pres., 1889, 1891–2, 1896, 1902–3 ; Sec., 1867 ; Council, 1893–5, 1902–4), *Lawnside, Brockenhurst, Hants.*
1902 Sharp, W. E., (Council, 1912–13), *Charterlea, Wokingham-road, Crowthorne, Berks.*
1886 Shaw, George T. (Librarian of the Liverpool Free Public Library), *William Brown-street, Liverpool.*
1905 Sheldon, W. George, *Youlgreave, South Croydon.*
1900 † Shepheard-Walwyn, H. W., M.A., *Dalwhinnie, Kenley, Surrey.*
1887 † Sich, Alfred, (Council, 1910–12), *Corney House, Chiswick,* W.
1911 Simes, James A., *Mon Repos, Monkham's-lane, Woodford-green, Essex.*
1904 Simmonds, Hubert W., *Sussex View, Cumberland-gardens, Tunbridge Wells, Kent.*
1913 Sitwell, Capt. F., *Wooler, Northumberland.*
1902 Sladen, Frederick William Lambart, *Dept. of Agriculture, Central Experimental Farm, Ottawa, Canada.*
1902 Sloper, Gerard Orby, F.Z.S., J.P., *Badminton Club, Piccadilly,* W.
1907 Sly, Harold Baker, *Mapledean, Ringley-avenue, Horley.*
1906 Smallman, Raleigh S., *Eliot Lodge, Albemarle-road, Beckenham, Kent.*
1901 Smith, Arthur, *County Museum, Lincoln.*
1911 Smith, B. H., B.A., *Edgehill, Warlingham, Surrey.*
1912 Smith, Roland T., 131, *Queen's-road, Wimbledon,* S.W.
1898 Sopp, Erasmus John Burgess, F.R.Met.S., 34, *Ferndale-road, Hove.*
1885 South, Richard, (Council, 1890–1), 4, *Mapesbury-court, Shoot-up-Hill, Brondesbury,* N.
1908 Speyer, Edward R., *Ridgehurst, Shenley, Herts.*
1889 Standen, Richard S., F.L.S., (Council, 1906), *Newlyn, Romsey, Hants.*

1910 Stanley, The Rev. Hubert George, *Marshfield Vicarage, Cardiff.*
1898 Stares, C. L. B., M.R.C.S., L.R.C.P., *The Limes, Swanley Junction, Kent.*
1898 Stebbing, Henry, *Chasewood, Round Oak Wood, Weybridge.*
1910 Stenton, Rupert, *St. Edward's, St. Mary Church, Torquay.*
1910 Stoneham, Hugh Frederick, Lieut. 1st Batt. E. Surrey Regt., *Stoneleigh, Reigate.*
1913 Storey, Gilbert, *Dept. of Agriculture, Cairo, Egypt.*
1896 Strickland, T. A. Gerald, *Southcott, Poulton, Fairford.*
1900 Studd, E. A. C., *P.O. Box* 906, *Vancouver, British Columbia.*
1895 Studd, E. F., M.A., B.C.L., *Oxton, Exeter.*
1882 Swanzy, Francis, *The Quarry, Sevenoaks.*
1908 Swierstra, Corn. J., 1st Assistant, *Transvaal Museum, Pretoria.*
1884 Swinhoe, Colonel Charles, M.A., F.L.S., F.Z.S., (V.-Pres., 1894; Council, 1891–3; 1902–4), 6, *Gunterstone-road, Kensington*, W.
1894 Swinhoe, Ernest, 6, *Gunterstone-road, Kensington*, W.
1876 Swinton, A. H., *Oak Villa, Braishfield, Romsey, Hants.*
1911 Swynnerton, C. F. M., *Gungunyana, Melsetter, S.-E. Rhodesia.*

1910 Tait, Robt., junr., *Roseneath, Harborough-road, Ashton-on-Mersey.*
1908 Talbot, G., *Witley Village, Surrey.*
1911 Tautz, P. H., *Cranleigh, Pinner, Middlesex.*
1893 Taylor, Charles B., *Gap, Lancaster County, Penn., U.S.A.*
1911 Taylor, Frank H., Australian Institute of Tropical Medicine, *Townsville, Queensland.*
1903 Taylor, Thomas Harold, M.A., *Yorkshire College, Leeds.*
1914 Temperley, Reginald, *Trevena, Harlow Oval, Harrogate*, and *L'Aurore, Vevey-la-Tour, Vaud, Switzerland.*
1909 Tetley, Alfred, M.A., 22, *Avenue-road, Scarborough.*
1910 Theobald, Prof. F. V., M.A., *Wye Court, Wye.*
1901 Thompson, Matthew Lawson, 40, *Gosford-street, Middlesbrough.*
1892 Thornley, The Rev. A., M.A., F.L.S., "*Hughenden*," *Coppice-road, Nottingham.*
1907 Tillyard, R. J., B.A., *Kuranda, Mount Errington, Hornsby, New South Wales.*
1911 Todd, R. G., *The Limes, Hadley Green*, N.
1897 Tomlin, J. R. le B., M.A., (Council 1911–3), *Lakefoot, Hamilton-road, Reading.*
1907 Tonge, Alfred Ernest, *Aincroft, Reigate, Surrey.*
1914 de la Torre Bueno, J. R., *Dasenbury Place, White Plains, New York, U.S.A.*
1907 Tragardh, Dr. Ivar, *The University, Upsala, Sweden.*
1859 † Trimen, Roland, M.A., F.R.S., F.L.S., (Pres., 1897–8; V.-Pres., 1896, 1899; Council, 1868, 1881, 1890), *Glaslyn, Waterden-road, Guildford.*
1906 Tulloch, Major James Bruce Gregorie, *The King's Own Yorkshire Light Infantry, Portobello Barracks, Dublin.*

1895 Tunaley, Henry, *Castleton, Searle-road, Farnham.*
1910 Turati, Conte Emilio, 4, *Piazza S. Alessandro, Milan, Italy.*
1898 Turner, A. J., M.D., *Wickham Terrace, Brisbane, Australia.*
1893 Turner, Henry Jerome, (Council, 1910-12), 98, *Drakefell-road, St. Catherine's Park, Hatcham,* S.E.
1906 Turner, Rowland E., (Council, 1909–10).

1893 Urich, Frederick William, C.M.Z.S., *Port of Spain, Trinidad, British West Indies.*

1904 † Vaughan, W., *The Old Rectory, Beckington, Bath.*
1914 Veitch, Robert, Entomologist, c/o Colonial Sugar Refining Co., *O'Connell-street Sydney, Australia.*
1909 Vidler, Leopold A., *The Carmelite Stone House, Rye, Sussex.*
1911 Vitalis de Salvaza, R., *Vientiane, Laos, Indo-China.*

1895 Wacher, Sidney, F.R.C.S., *Dane John, Canterbury.*
1897 Wainwright, Colbran J., (Council, 1901, 1912–), 45, *Handsworth Wood-road, Handsworth, Birmingham.*
1878 Walker, James J., M.A., R.N., F.L.S., (Council, 1894; Secretary, 1899, 1905–), *Aorangi, Lonsdale-road, Summertown, Oxford.*
1912 Wallace, Henry S., 17, *Kingsley-place, Heaton-on-Tyne.*
1914 Walsh, Mrs. Maria Ernestina, *Soekaboemi, Java, Dutch East Indies.*
1866 † Walsingham, The Right Honble. Lord, (Pres., 1889–90; V.-Pres., 1882, 1888, 1891–2, 1894–5; Council, 1896), *British Museum (Natural History), Cromwell-road,* S.W.
1910 Ward, John J., *Rusinurbe House, Somerset-road, Coventry.*
1908 Warren, Brisbane C. S., *Villa Romaine, sur Clarens, Switzerland.*
1886 * Warren, Wm., M.A., *Downs Villas, Park-road, Tring, Herts.*
1912 Waterfield, Mrs. Ellen N., c/o. W. M. Crowfoot, Esq., *Blyburgate House, Beccles,* and *The Hospital, Port Sudan.*
1869 Waterhouse, Charles O., I.S.O., (Pres., 1907–8; V.-Pres., 1900, 1909; Council, 1873, 1882–3; 1898–1900), *Ingleside, Avenue-gardens, Acton,* W.
1901 † Waterhouse, Gustavus A., B.Sc., F.C.S., *Allonrie, Stanhope-road, Killara, New South Wales, Australia.*
1914 Waterston, Rev. James, B.D., B.Sc., 22, *Blandford-road, Bedford Park,* W.
1914 Watt, Morris N., *St. John's Hill, Wanganui, New Zealand.*
1893 Webb, John Cooper, 218, *Upland-road, Dulwich,* S.E.
1876 † Western, E. Young, 27, *Pembridge-square, Notting Hill Gate,* W.
1906 Wheeler, The Rev. George, M.A., F.Z.S., Vice-President, (Secretary, 1911–), 37, *Gloucester-place,* W.
1910 White, Edward Barton, M.R.C.S., *Cardiff City Mental Hospital, Cardiff.*
1907 White, Harold J., 42, *Nevern-square, Kensington,* S.W.

1911 Whitehouse, H. Beckwith, M.S., F.R.C.S., 52, *Newhall-street, Birmingham.*

1913 † Whitley, Percival N., *New College, Oxford*, and *Brankwoods, Halifax.*

1913 † Whittaker, Oscar, *Ormidale, Ashlands, Ashton-upon-Mersey.*

1911 Whittingham, Rev. W. G., *Knighton Rectory, Leicester.*

1906 Wickwar, Oswin S., *Charlemont, Gregory-road, Colombo, Ceylon.*

1903 Wiggins, Clare A., M.R.C.S., *Entebbe, Uganda.*

1896 Wileman, A. E.

1910 Willcocks, Frank C., Entomologist to the Khedivial Agricultural Society, *Cairo, Egypt.*

1911 Williams, C. B., *The John Innes Horticultural Institute, Mostyn-road, Merton, Surrey.*

1894 Wolley-Dod, F. H., *Millarville P. O., Alberta, N.W.T., Canada.*

1881 Wood, The Rev. Theodore, *The Vicarage, Lyford-road, Wandsworth Common*, S.W.

1905 Woodbridge, Francis Charles, *South Mead, The Common, Gerrard's Cross, S.O., Bucks.*

1914 Woodforde, Francis Cardew, B.A., 19, *Friar's Entry, Oxford.*

1912 Woodruffe-Peacock, Rev. E. Adrian, F.L.S., F.G.S., *Cadney Vicarage, Brigg, Lincolnshire.*

1888 Yerbury, Colonel John W., late R.A., F.Z.S., (Council, 1896, 1903–5), 2, *Ryder-street, St. James's*, S.W.

1892 Youdale, William Henry, F.R.M.S., 21, *Belle-Isle-street, Workington.*

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During the Year 1914.

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Aiyar (T. V. A.). On the Life-history of *Coptosoma cribraria*, Fabr.
[Journ. Bombay Nat. Hist. Soc., Sept. 30, 1913.]

———— Note on the Life-history of a Phasmid.
[Journ. Bombay Nat. Hist. Soc., Dec. 20, 1913.] *The Author.*

Ashby (E. B.). Some account of the Butterflies of Vernet-les-Bains, in MSS., Jan. 1914. *The Author.*

Ashmead (W. H.). [See Fauna Hawaiiensis, Vol. I.]

Bacot (A. W.). A study of the Bionomics of the common Rat Fleas and other species associated with human habitations, with special reference to the influence of temperature and humidity at various periods of the life-history of the insect.
[Journ. Hygiene, Plague Suppl. III, Jan. 14, 1914.]

———— The influence of temperature, submersion and burial on the survival of eggs and larvae of *Cimex lectularius*.
[Bull. Ent. Research, Vol. V, Pt. 2, 1914.] *The Author.*

————, Petrie (G. F.), and Todd (Ronald E.). The Fleas found on Rats and other rodents, living in association with man, and trapped in the towns, villages, and Nile boats of Upper Egypt. *The Authors.*
[Journ. Hygiene, Vol. XIV, No. 4, 1914.]

———— and Ridewood (W. G.). Observations on the larvae of Fleas.
[Parasitology, Vol. VII, 1914.] *The Authors.*

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Beddard (F. E.). [See Fauna Hawaiiensis, Vol. II.]

Berlese (Antonio). Gli Insetti, Vol. II, Fasc. 7, 8, 1914. *The Author.*

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Blanchard (R.). [See Journ. Board Agric., Brit. Guiana, Jan. 1914.]

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I. Los panfaginos paleárticos.
II. El género *Sciobia*, Burm. (*Platyblemmus*, Serv.).
III. El género, *Hieroglyphus*, Krauss, y otros próximos.
[Trabajos del Museo Ciencias Nat., Madrid, Núm. 6, 1912.] *The Author.*

Bowater (W.). Heredity of Melanism in Lepidoptera.
[Journ. Genetics, Vol. III, No. 4, 1914.] *The Author.*

Burr (Malcolm). Dermaptera collected in Natal and Zululand by Dr. Ivar Trägårdh.
[Göteborgs Musei Zoologiska Afdelning, 2, 1913.]

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[Tijdschr. voor Entom., Deel LVI, 1913.]

——— Notes on the Forficularia. XX. A new genus and five new species from Australia.
[Ann. and Mag. Nat. Hist., Ser. 8, Vol. XIII, Jan. 1914.]

——— Notes on the Forficularia. XXI. Progress in Dermaptera in 1912 and 1913.
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——— Notes on the Forficularia. XXII. Notes on the Wing-venation in the Dermaptera.
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——— Notas de Dermapterologia Americana.
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——— Quelques Dermaptères du Madagascar du Muséum de Genève.
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[F. Sarasin and J. Roux, Nova Caledonia, Zoologie, Vol. I, No. 7, 1914.] *The Author.*

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——— and Imms (A. D.). Indian Dermaptera collected by Dr. A. D. Imms.
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———, and Jordan (K.). On *Arixenina*, Burr, a sub-order of Dermaptera.
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[Ohio Dept. Agric., Bull. No 219, 1914.] *The Dept. Agric.*

Campbell (W.). A new Sugar-cane pest [a moth caterpillar].
[Union S. Africa Dept. Agric., Circular No. 33, 1913.]
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[Econ. Proc. Roy. Dubl. Soc., Vol. II, No. 9, 1914.]

——— and Hewitt (T. R.). The reproductive organs and the newly-hatched larva of the Warble-fly (*Hypoderma*).
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[Trans. Linn. Soc., Zool., 2nd series, Vol. XVI, Pt. 4, 1914.]

——— Notes on the Australian Xylophilidae described by Blackburn, with a description of a remarkable new species from Queensland.
[Ent. Monthly Mag., 2nd series, Vol. XXV, 1914.]
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——— *Homonotus* (*Pompilus*) *sanguinolentus*, F., in Surrey, with notes on the characters of the ♂ and the distribution of the genus, by the Rev. F. D. Morice.
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——— [See Viereck (H. L.).]

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Pars 57. Bernhauer (M.) et Schubert (K.). Staphylinidae, IV.
„ 58. Pic (M.). Dascillidae, Helodidae, Eucinetidae.
„ 60. Jeannel (R.). Silphidae: Subfam. Bathysciinae.
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——— (J. C.). Hymenoptera, Superfamilies Apoidea and Chalcidoidea, of the Yale-Dominican Expedition of 1913.
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De (M. N.). Instructions for rearing Mulberry Silk-worms.
[Agric. Research Instit., Pusa, Bull. No. 39, 1914.]
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Distant (W. L.). Homoptera. Fam. Cicadidae. Subfam. Gaeaninae.
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——— The Noctuid Moths of the genera *Palindia* and *Dyomyx*.
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——— Report on the Lepidoptera of the Smithsonian Biological Survey of the Panama Canal Zone.
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——— Descripción de los Coleópteros recogidos en el Sus.
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[Smithsonian Misc. Coll., Vol. LX, No. 30, Vol. LXIII, No. 8, 1913, 1914.] *The Institution.*

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[Bull. Soc. Vaudoise Sci. Nat., 5e ser., Vol. XLIX, 1913.]

——— Le genre *Camponotus*, Mayr, et les genres voisins.
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The Author.

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[Mem. Dept. Agric. India, Entom. series, Vol. V, No. I, April, 1914.] *Dept. Agric. India.*

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——— The Preparatory Stages of *Apocheima rachelae*, Hulst (Lepidoptera).
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THE

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OF

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FOR THE YEAR

1914.

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TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1914.

I. *New Species of* Lepidoptera-Heterocera *from S.E. Brazil.*

By E. DUKINFIELD-JONES, F.Z.S.

PART I.

[Read February 4th, 1914.]

PLATE I.

Fam. SYNTOMIDAE.

Pseudosphex aracia, sp. n.

♂. Palpi outwardly black mixed with yellow, inwardly yellow; pectus white; legs yellow, the fore-tibiae and tarsi and mid-tarsi outwardly fuscous; frons yellow; vertex of head and antennae black; a white point at base of antennae; back of head yellow; tegulae yellow in front, black behind; thorax black with anterior subdorsal yellow stripes and large posterior geminate yellow patch; patagia black with central yellow stripe; abdomen, basal half dorsally pale reddish brown to 4th segment which shades into black, terminal segments black, the tubercles on 1st segment yellow defined by black line, valve yellow fringed with white. Fore-wings yellowish hyaline, the veins black; outer half suffused with black from costa to vein 5, running into fine line in cell; a fine black fascia along submedian fold; a purple reflexion in and beyond cell; inner margin yellow suffused with black at base and with cupreous

purple reflexion; termen and cilia black. Hind-wings yellowish hyaline, a fine black fascia through cell and along discal fold.

Expanse 28 mm.

Hab. Araçatuba, W. São Paulo.

Sphecosoma linda, sp. n.

♂. Palpi dull orange yellow, some black scales on 1st joint; legs dull orange yellow, fore- and mid-tarsi suffused with black above; frons yellow; vertex of head black; back of head yellow with metallic green reflexion; antennae black, the shaft outwardly red; tegulae yellow with broad black anterior band; thorax black and yellow, a metallic light green reflexion on metathorax; patagia black with yellow edges; abdomen yellow with proximal reddish brown suffusion on 2nd segment and darker brown on 3rd, the remaining segments anteriorly broadly black and posteriorly narrowly yellow, a metallic light green reflexion on tubercles of 1st segment and on posterior half of 2nd and 3rd; beneath whitish. Fore-wings hyaline, the veins black excepting 9, 10 and 11 which are yellow; a black fascia along discal fold and short ones above veins 6 and 7; inner margin yellow suffused with black; termen and cilia black. Hind-wings hyaline, the veins, termen and cilia black.

Expanse 25 mm.

Hab. Araçatuba, W. São Paulo.
Allied to *S. sparta*, Druce.

Sphecosoma matta, sp. n.

♂. Palpi pale yellow, mixed with black on 1st joint; legs orange yellow, fore- and mid-tarsi suffused with black; pectus pale yellow; frons and vertex of head black mixed with whitish; back of head and cheeks yellow; antennae black, extremity and streak at base orange; tegulae yellow in front, black behind; patagiae black with central yellow stripe; thorax black and yellow; abdomen, 1st segment black with subdorsal yellow stripes, tubercles anteriorly fuscous, posteriorly yellow, 2nd segment anteriorly reddish brown and laterally yellow, 3rd segment dark reddish brown and the remainder black with posterior narrow yellow band; underneath yellow. Fore-wings yellowish hyaline, the veins black irrorated with orange; subcostal area and inner margin dull orange; a fine black fascia in cell and along discal fold and shorter ones above veins 6 and 7; termen black; cilia black mixed with dull orange. Hind-wings yellowish hyaline,

the veins black irrorated with orange; a fine black fascia along discal fold; termen black; cilia black with some orange scales.

Expanse 22 mm.

Hab. Araçatuba, W. São Paulo.

Sphecosoma alica, sp. n.

♂. Palpi, 1st joint dark reddish brown, 2nd ochreous white, 3rd ochreous; femora dull orange above, black beneath; hind femora with black ring at upper end; frons dark reddish brown surrounded with greyish white; vertex of head dark reddish brown with slight purplish reflexion; back of head with a few yellow scales mixed with the brown; antennae black, the shaft dull orange brown near extremity; tegulae dark brown with some yellow at sides; thorax and patagia dark red brown with scattered dull yellow hairs and scales; abdomen, segments 1–3 dark reddish brown, a lateral yellow patch on 2nd segment, the remaining segments black with narrow posterior yellow bands, beneath yellowish. Fore-wings yellowish hyaline, the veins black with scattered dull orange scales; costa and inner margin dull orange; a fine dark fascia in cell and along discal fold; short fasciae above veins 6 and 7; termen black; cilia black mixed with dull orange. Hind-wings yellowish hyaline; costa dull orange; a fine dark fascia along discal fold; termen black; cilia dull orange.

Expanse 20 mm.

Hab. Araçatuba, W. São Paulo.

Sphecosoma semelina, sp. n.

♂. Palpi, 1st joint dull orange, 2nd and 3rd black with scattered orange hairs; pectus, legs and underside of abdomen dull orange; tibiae and tarsi heavily suffused with black above; frons white; head and antennae black; tegulae, patagia and thorax black mixed with dull orange; abdomen dull orange irrorated and suffused with dark brown, a broad dark brown dorsal stripe, narrow lateral stripes on first four segments. Fore-wings hyaline, the veins black; an orange point at base of costa; a short orange fascia at base of vein 1; inner margin black, termen narrowly black, expanding from below vein 5 to origin of vein 7. Hind-wings hyaline; base orange; costa, termen and inner margin black.

Expanse 24 mm.

Hab. Alto da Serra, Santos.

Loxophlebia aurantegula, sp. n.

♀. Black; a few whitish scales round frons; a whitish band round antennae near extremity; tegulae anteriorly black, posteriorly orange; a few orange scales on patagia. Fore-wings hyaline, the veins broadly black; black fasciae on discal and submedial folds; costa and inner margin narrowly black; termen narrowly black expanding at tornus, below vein 2 and from below vein 4 to origin of vein 8, forming broad apical space; a moderate discocellular bar. Hind-wings; inner margin rather broadly black; termen narrow at vein 2, moderately broad at apex; a black fascia on discal fold.

Expanse 25 mm.

Hab. Guarujá, Santos.

Mesothen pyrrhina, sp. n.

♂. Palpi black, a white ring at base of 2nd and 3rd joints; legs fuscous, the 1st joint of tarsi greyish white; inner side of hind femora greyish white; head fuscous, a few whitish hairs on vertex and back; antennae fuscous, the tips white; tegulae orange surrounded by white; patagia and thorax orange, a small whitish dorsal spot on metathorax; abdomen fuscous, broad black dorsal and lateral stripes on segments 1–4; some grey scales at base of valve. Fore-wings hyaline, the veins broadly black, discocellulars narrowly and margins rather broadly black, especially at tornus and apex; black fasciae along discal and submedian folds. Hind-wings hyaline, the veins broadly black; margins moderate; a black fascia along submedian fold.

♀. The tarsi with much less white than the male. Fore-wings suffused in and beyond cell, from the fasciae above vein 6 and on submedian area.

Expanse ♂ 22 mm., ♀ 24 mm.

Hab. Guarujá, Santos; Araçatuba, W. São Paulo.

Cosmosoma rasera, sp. n.

♂. Black; frons, vertex and back of head with a few metallic greenish blue scales; antennae white at tips; abdomen, a lateral series of metallic green-blue patches; valve metallic green-blue, white at extremity. Fore-wings hyaline, the veins rather broadly black; termen black expanding at tornus and apex, reaching to origin of vein 7. Hind-wings hyaline; termen broadly black from tornus to vein 2 where it suddenly diminishes expanding again to apex.

♀. Similar to male, but with metallic green-blue patches on thorax; abdomen beneath white on segments 2–4, some green-blue scales on 2nd.

Expanse ♂ 30 mm., ♀ 32 mm.

Hab. Alto da Serra, Santos; Castro, Paraná.

Closely allied to *C. durca*, Schaus, but differs from it in the white tips of antennae, absence of white on tarsi, absence of blue on tegulae and patagia and in different terminal band in both wings.

Diptilon gladia, sp. n.

♂. Palpi black, 2nd and 3rd joints with some brown in front; femora black; fore- and mid-tarsi yellow beneath; hind tibiae yellow beneath, tarsi almost entirely yellow; frons brownish grey; head, antennae, tegulae, patagia and thorax black; some orange on cheeks and shoulders; abdomen black, the anal tuft brownish grey, underneath whitish yellow to 5th segment, a small yellow spot on anal segment. Fore-wings yellowish hyaline, the veins narrowly black; a narrow discocellular bar, expanding into a spot on the fold; a subcostal orange spot at base; some scattered yellow scales on outer third of costa; inner margin broadly black; termen narrowly black, expanding from below vein 5 to apex; cilia black. Hind-wings; upper half orange lower half black; termen black; cilia orange.

Expanse 25 mm.

Hab. Araçatuba, W. São Paulo.

Eumenogaster baura, sp. n.

♂. Palpi; 1st joint black, 2nd and 3rd white with some black scales at sides; pectus white; fore-femora black with white patch, tibiae and tarsi black; mid-femora purplish black, tibiae streaked with red, tarsi yellow; hind-femora black streaked with red, tibiae red with some black at distal end; frons white; vertex of head black with some yellow hairs at base of antennae; back of head yellow; antennae black; tegulae yellow; patagia black, fringed with yellow hairs; thorax black with long yellow hairs; abdomen 1st segment black with two subdorsal orange spots, 2nd segment ochreous yellow in front, black behind, a black dorsal stripe running into the posterior black, subdorsal diagonal orange streaks between the yellow and black; 3rd and 4th segments reddish purple; the remaining segments purplish brown. Fore-wings yellow hyaline; the veins black, the median ones irrorated with yellow; the discocellulars red; a bright crimson subcostal fascia from base to apex;

a dark space thickly sprinkled with black and red scales in and beyond cell, extending to near apex, the red predominating about the discocellulars; some yellow hairs at base of median nervure; inner margin black, a red streak from near base to middle and some red and yellow scales at tornus; a yellow streak at base of vein 1; termen narrowly black; cilia black, shading to brown at apex. Hind-wings yellow hyaline; costa yellow at base, black at apex; upper half of cell filled with black and red scales; inner margin with long yellow hairs at base; termen and cilia black. Underside: the suffused space on fore-wings is much redder than on upperside; hind-wings inner half of costal area yellow, outer half red; inner margin yellow.

Expanse 28 mm.

Hab. Baurú, W. São Paulo.

Heliura nivaca, sp. n.

♂. Palpi orange, 3rd joint black; coxae and femora crimson; fore- and mid-tibiae crimson point at each end; hind-tibiae, proximal half crimson, distal half fuscous; 1st joint of all tarsi crimson, the rest fuscous; frons and vertex of head dark brown with metallic reflexion; back of head crimson; antennae black with purple reflexion; tegulae, patagia and thorax crimson; abdomen crimson, fine silvery blue posterior bands on the segments; a silvery blue interrupted dorsal line and lateral patches on 2nd and 3rd segments. Fore-wings hyaline; base crimson; a broad black medial band crossing end of cell from costa to inner margin; subcostal and median nervures yellow; a large yellow subcostal patch beyond the band, reaching from costa to well below vein 6; apex broadly black; inner margin and termen black. Hind-wings hyaline; costa and inner margin yellow; termen and apex black.

Expanse 23 mm.

Hab. Nivac, Matto Grosso.

Ctenucha nana, sp. n.

♂. Neck and 1st joint of palpi orange, 2nd joint inwardly orange and white, outwardly fuscous, 3rd fuscous; fore-coxae pure white; legs white beneath, fuscous above; frons fuscous, some white hairs at base of antennae; some orange hairs on back of head; antennae fuscous black; thorax and patagia fuscous slightly streaked with grey; abdomen fuscous, anal tuft orange, ventral surface whitish with white transverse bands. Fore-wings fuscous black, the veins lighter; a wedge-shaped white spot beyond cell from subcostal to

vein 3. Hind-wings fuscous black with slight dark blue reflexion; cilia white. Underside of fore-wings with broad bluish white fascia below cell at base: hind-wings with bluish white fascia in cell and a little beyond.

Expanse 28 mm.

Hab. GUARUJÁ, Santos.

Ctenucha manuela, sp. n.

♂. Neck and 1st joint of palpi orange, 2nd joint base and inner side orange, outwardly black, 3rd joint black; legs whitish beneath, fuscous above; frons brownish grey; vertex of head fuscous; some orange at back of head; antennae black; tegulae black with some orange at base; thorax black with slight blue gloss, a white dorsal streak and faint streaks on patagia; abdomen black with blue gloss, underneath whitish with transverse bands, anal tuft orange. Fore-wings fuscous black, the veins fuscous; a wedge-shaped white spot beyond cell from subcostal to vein 3; cilia black. Hind-wings black with dark blue reflexion; cilia white at apex only. Underside with broad bluish white fascia below cell at base.

Expanse 33 mm.

Hab. GUARUJÁ, Santos; ALTO DA SERRA, Santos; CASTRO, Paraná.

Fam. ARCTIADAE.

Nola niveibasis, sp. n.

♀. Palpi and fore-femora ochreous speckled with brown and white; pectus white; legs white and brown; head, tegulae, thorax and patagia white; abdomen ochreous. Fore-wings ochreous heavily irrorated with fuscous and brown; basal area pure white, excepting the costa which is ochreous irrorated with fuscous, the white space extending to well beyond middle of cell, where it forms a right angle, the upper edge outwardly oblique from costa, the lower inwardly oblique to inner margin; all the lines diffused and vague; some white near costa beyond the postmedial and subterminal lines. Hind-wings ochreous irrorated with light brown; base of costal area white.

Expanse 17 mm.

Hab. CASTRO, Paraná.

Thyone purpurea, sp. n.

♀. Palpi black; legs, head, antennae, tegulae, patagia and thorax black shot with purple and green; hind-tarsi fuscous; a yellowish grey dorsal patch on metathorax; abdomen dark brown, a slight purplish green reflexion on the dorsum. Fore-wings dark fuscous brown with purple reflexion; a large yellowish grey spot at base of submedian fold and a similar one slightly more distal below it on inner margin; a yellowish grey spot in middle of cell and one above it below costa; a broad yellowish grey band beyond cell from costa to inner margin, narrowest at lower angle of cell and widest on submedian fold, the veins across it dark purplish brown; cilia brown. Hind-wings fuscous, the margins darker.

Expanse 32 mm.

Hab. Castro, Paraná.

Illice blanda, sp. n.

♂. Palpi 1st joint yellow, 2nd fuscous, 3rd brown; fore-coxae fuscous black, inwardly yellow; fore-femora and tibiae fuscous black, tarsi fuscous and yellow; mid- and hind-coxae yellow; mid-femora and tibiae yellow, the tibiae and tarsi streaked with fuscous; hind legs entirely yellow; frons yellow; vertex of head brown; back of head yellow; antennae banded with black and yellow; tegulae yellow; thorax fuscous; patagia fuscous with yellow tips; abdomen yellow. Fore-wings yellowish fuscous thickly irrorated with black; an oval yellow space at base from median nervure to inner margin, extending one-third of inner margin; a broad S-shaped yellow band from costa to inner margin across end of cell, the acute points outward at costa and inward at inner margin; cilia inwardly dark brown, outwardly light brown. Hind-wings darker yellow; a large irrorated fuscous space at apex.

Expanse 20 mm.

Hab. Alto da Serra, Santos.

Illice trimaculata, sp. n.

♂. Palpi ochreous yellow, a slight pink shade on 1st joint; legs ochreous yellow; fore- and mid-tibiae and tarsi shaded with brown; head light brown; antennae fuscous; tegulae pink; thorax brown; patagia anteriorly brown, posteriorly yellow; abdomen pink. Fore-wings pale yellowish pink, thickly suffused and irrorated with brown, the irrorations being very thick on submedian area from base to vein 2; terminal area light brown irrorated with dark brown; a yellow space from base to middle of inner margin; the medial band

represented by a small spot on costa and a larger one on inner margin. Hind-wings pink; apex brown; cilia yellow to near apex. Underside: fore-wings pink, the termen and apex broadly brown.

Expanse 17 mm.

Hab. Castro, Paraná.

Nodozana jucunda, sp. n.

♂. Palpi yellow, 3rd joint fuscous; legs yellow and fuscous; hind-femora with tuft of long black hairs; frons brown; vertex of head and tegulae bright buff yellow; antennae dark brown, whitish at tips; thorax brown; patagia brown fringed with yellow; abdomen rosy red, yellow beneath. Fore-wings pale buff yellow; costa black from base to middle; a diffused fuscous antemedial band, straight from costa to cell, then obliquely and evenly excurved to near middle of inner margin; a similar medial band, straight from costa to lower angle of cell, then slightly incurved to near antemedial on inner margin; a postmedial band inwardly oblique to vein 10, excurved to vein 3 where it is angled inwards, then straight and finally incurved just at tornus; termen diffused fuscous; cilia fuscous mixed with pink; the medial and apical areas suffused with pink and heavily irrorated with fuscous; a crimson spot beyond cell on constricted yellow band between the dark areas. Hind-wings buff yellow suffused with rosy red; anal angle very acute.

Expanse 15 mm.

Hab. Guarujá, Santos.

Lycomorphodes aracia, sp. n.

♂. Palpi fuscous; legs fuscous streaked with ochreous orange; 1st joint of mid- and hind-tarsi ochreous orange with fuscous extremities; frons fuscous; vertex and back of head ochreous orange; antennae black; tegulae fuscous and orange; thorax fuscous, an indistinct orange dorsal line; patagia fuscous; shoulders orange; abdomen fuscous, anal tuft orange. Fore-wings black; a subcostal orange streak at base; an ochreous medial band, orange at costa, broken at median nervure, the lower half placed distally to upper half. Hind-wings fuscous, the costal area ochreous to middle.

Expanse 17 mm.

Hab. Araçatuba, W. São Paulo.

Clemensia torniplaga, sp. n.

♂. Palpi ochreous white; the 2nd joint fuscous at sides; frons, head, antennae, tegulae and body ochreous white. Fore-wings

ochreous white; some indistinct pale yellowish brown suffusion at base below costa and before antemedial line; antemedial line fine, wavy, diffused, dark brown, angled outwardly below costa, in upper part of cell, on median nervure and on vein 1; a medial diffused light brown shade outwardly curved through end of cell to inner margin; postmedial line very indistinct; an indistinct suffused light yellowish brown, wavy subterminal band, most pronounced above veins 4 and 5; termen diffused yellowish brown; a dark lunular spot on discocellulars; three small confluent spots beyond cell above veins 3–5; a large dark space from below cell and vein 3 to tornus, thickly irrorated with black. Hind-wings white.

Expanse 13 mm.

Hab. São Paulo, S.E. Brazil.

Clemensia nubila, sp. n.

♂. Palpi fuscous; frons brown; back of head ochreous; antennae light brown; tegulae and thorax ochreous sprinkled with brown. Fore-wings ochreous suffused with light reddish brown; a wavy diffused dark antemedial line, excurved from costa to submedian fold, where it is strongly bent inwards to inner margin near base; a broad diffused black band, separated from antemedial by narrow light space, from costa to inner margin, very broad in cell, reaching beyond middle, outwardly dentate with black points on costa, subcostal, median nervure, submedian fold and vein 1; a diffused wavy brown medial line angled inwards on median nervure and on vein 1; a small diffused black spot at lower angle of cell and one on discocellulars; a postmedial series of diffused black spots on the veins; a dark subterminal band, followed by light shade; termen dark brown; cilia lighter. Hind-wings white suffused with light reddish brown on the margins.

Expanse 17 mm.

Hab. São Paulo, S.E. Brazil.

Clemensia flava, sp. n.

♂. Palpi inwardly ochreous, outwardly fuscous; legs ochreous, the fore-tibiae and tarsi streaked with fuscous; frons and antennae ochreous; head, tegulae, patagia and thorax buff; abdomen ochreous. Fore-wings bright buff; costa black from base to ⅓. Hind-wings paler.

Expanse 22 mm.

Hab. Fernandes Pinheiro, Paraná.

Automolis noiva, sp. n.

♀. Palpi 1st joint white at base, black at tip, a crimson streak on outside; 2nd joint crimson, a white spot at base; 3rd black at base, white at tip; femora yellow above, white beneath, a black spot on distal joint; tibiae yellow above, two black spots on middle and black termination; tarsi white ringed with black, 3rd and 4th joints crimson above; head white mixed with black, some yellow before and behind antennae; antennae shaft white, pectinations black; tegulae white mixed with black and fringed with crimson; thorax white, a short crimson dorsal line from tegulae, two subdorsal crimson spots on metathorax; patagia white irrorated with black and outwardly yellow; abdomen white. Fore-wings white with slight pale blue reflexion; the veins with scattered fuscous scales; subcostal yellow to origin of vein 7; a black spot at base of costa and one below base of cell; two fuscous streaks with olive green reflexion in cell united at base, the upper one the broader of the two and reaching to discocellular bar, the lower one very fine and not reaching to end of cell; two similar fine streaks on submedian area, reaching beyond origin of vein 2; discocellulars enclosed between two dark lines. Hind-wings pure white.

Expanse 45 mm.

Hab. Alto da Serra, Santos.

Ischnocampa styx, sp. n.

♂. Brown; head, tegulae and patagia streaked with lighter shade; abdomen brown, slightly lighter beneath. Fore-wings brown, the veins darker. Hind-wings a rather lighter shade, the central area semihyaline.

Expanse 48 mm.

Hab. Alto da Serra, Santos.

Closely allied to *I. lugubris*, Schaus, but differs from that species in the absence of lateral stripes on the abdomen, the fore-wings being evenly clothed with scales and vein 3 being much farther from angle of cell.

Haemaphlebia strigata, sp. n.

♂. Palpi light brown; fore- and mid-legs light brown, hind-legs paler; frons ochreous with a brown bar; head ochreous, a minute posterior red spot; tegulae, patagia and thorax buff streaked with red; abdomen dorsally rose red, ventrally ochreous; fore-wings buff; costa light brown, a minute red spot at base; a red fascia at base of subcostal; a red fascia in cell with downward branch at middle; fine red lines on upper and lower edges of cell; the veins

from 2 to 8 enclosed between red lines, interrupted at postmedial and subterminal lines; a geminate red fascia on submedian area before origin of vein 2, the lower branch continued to termen, but interrupted at postmedial line; a rose red fascia at base of inner margin; two light brown spots, irregularly defined by darker shade, at middle of cell; two spots at end of cell and one beyond cell confluent; a postmedial series of dark brown lunular spots, followed by confluent light brown ones forming a scalloped band from middle of inner margin to termen between veins 5 and 6; a subterminal line of brown spots between the veins; a terminal row of smaller spots; outer half of inner margin brown; cilia buff with brown spots between the veins. Hind-wings; upper half to median nervure ochreous, lower half rose red extending to near apex. Underside ochreous, the spots brown.

Expanse 41 mm.

Hab. Alto da Serra, Santos.

Paranerita bione, sp. n.

♀. Palpi 1st joint buff, 2nd and 3rd orange red; legs buff, fore-tibia red; frons orange red crossed by broad light brown bar; vertex of head yellow; back of head orange red; base of antennae orange red; antennae basal half brown, terminal half white; thorax pale whitish brown, darker in centre; patagia brown in front, shading to whitish brown; abdomen dorsally roseate, ventrally buff. Fore-wings ochreous grey, suffused with purplish brown, darkest on outer half, the veins, except vein 1, darker; base of costa brown followed by bright yellow triangular patch with rounded apex, reaching to well beyond cell and extending to lower half of cell, the outer side angled outwards on discal fold just beyond cell and inwards at upper angle of cell; a strongly sinuous subterminal line, very oblique from costa to close to termen at vein 7, from vein 5 bent inwards and slightly incurved to vein 3, then bent outwards to termen at vein 2; terminal area bright yellow; all the yellow spaces separated from the purple brown by a line of bright orange red followed on the inner side by dark purplish brown, the red line of costal triangle and of terminal area confluent on costa; cilia yellow. Hind-wings dull roseate with brown suffusion below cell extending almost to termen; cilia yellow.

Expanse 34 mm.

Hab. Alto da Serra, Santos.

Explanation of Plate I.

[*See Explanation facing the* Plate.]

Explanation of Plate I.

Fig. 1. *Pseudosphex aracia*, ♂, p. 1.
2. *Sphecosoma matta*, ♂, p. 2.
3. ,, *linda*, ♂, p. 2.
4. ,, *alica*, ♂, p. 3.
5. ,, *semelina*, ♂, p. 3.
6. *Loxophlebia aurantegula*, ♀, p. 4.
7. *Mesothen pyrrhina*, ♂, p. 4.
8. *Heliura nivaca*, ♂, p. 6.
9. *Diptilon gladia*, ♂, p. 5.
10. *Cosmosoma rasera*, ♂, p. 4.
11. *Eumenogaster baura*, ♂, p. 5.
12. *Ctenucha nana*, ♂, p. 6.
13. ,, *manuela*, ♂, p. 7.
14. *Automolis noiva*, ♀, p. 11.
15. *Ischnocampa styx*, ♂, p. 11.
16. *Haemaphlebia strigata*, ♂, p. 11.
17. *Paranerita bione*, ♀, p. 12.
18. *Thyone purpurea*, ♀, p. 8.
19. *Nola niveibasis*, ♀, p. 7.
20. *Illice blanda*, ♂, p. 8.
21. ,, *trimaculata*, ♂, p. 8.
22. *Nodozana jucunda*, ♂, p. 9.
23. *Lycomorphodes aracia*, ♂, p. 9.
24. *Clemensia torniplaga*, ♂, p. 9.
25. ,, *nubila*, ♂, p. 10.
26. ,, *flava*, ♂, p. 10.

II. *Revision of the Mexican and Central American* Malachiidae *and* Melyridae, *with descriptions of new species.* By George Charles Champion, F.Z.S.

[Read November 19th, 1913.]

Plate II.

The present paper has been prepared to give an account of the Malachiidae and Melyridae accumulated by the Editors of the "Biologia Centrali-Americana" since the completion of the supplement to the Rev. H. S. Gorham's work on these insects, published in 1886. To determine them the whole of the material in the British Museum named by him has had to be re-examined, and the sex of the specimens ascertained, before the descriptions of the new forms could be drawn up. The other collections in the National Museum, especially that of Fry, have also furnished many novelties from Mexico. Tables of the numerous species of the Malachiid genera *Collops* and *Attalus*, and of the Melyrid genera *Trichochrous* (= *Pristoscelis*, Gorh.) and *Listrus*, are appended. For convenience of reference the species here dealt with are renumbered in the following pages. No fresh material has come to hand of the genera *Helcogaster* (Malachiidae), and *Cymbolus*, *Eucymbolus*, *Astylus*, and *Antixoon* (Melyridae), and they are omitted from the present enumeration. *Eucymbolus* and a new species of *Cymbolus* (*elongatus*) were described by me in the Trans. Ent. Soc. Lond. 1913, pp. 128–130. The genera *Micromimetes*, *Pseudattalus*, *Pseudebaeus*, *Sphinginus*, *Dasytellus*, and *Mecomycter* are additions to the Mexican or Central American fauna.

Fam. MALACHIIDAE.

Collops.

Collops, Erichson, Entomographien, p. 54 (1840); Horn, Trans. Am. Ent. Soc., iii, p. 79 (1870); Gorham, Biol. Centr.-Am., Coleopt. iii, 2, pp. 113 (1882), 313 (1886);

Schaeffer, Canad. Ent. 1912, p. 184; Fall, Journ. N. York Ent. Soc. xx, p. 249 (Dec. 1912).

Collops is a genus distinguished by its 10-jointed antennae in both sexes, and by the males having an enormously developed peculiarly formed second antennal joint (usually furnished with a long appendage) and simple 4-jointed anterior tarsi. The additional material to hand from Mexico, etc., enables me to give the ♂ characters of nearly all the species here enumerated. Horn, in 1870, described, and figured, the articulated appendage (of *C. validus*) arising from near the base of the second joint as resembling an elongated inner maxillary lobe, slender, and furnished at the tip with a brush of stiff curled hairs, and stated that the appendage varied in size and development according to the species. He did not, however, use this essential character for distinguishing the numerous N.-American forms, and Gorham was equally silent on the subject when dealing with the Central American *Collops*, both authors mainly relying on colour. Another important character is the presence in various species of a depressed, goggle-like, polished, subglabrous area on each side of the head before the eyes, sometimes wanting or feebly indicated in ♀. The shape of the first and third antennal joints in ♂, too, often affords good differential characters. The antennae and anterior legs are sometimes differently coloured in the two sexes, and the head in those forms in which the anterior portion is more or less testaceous usually have this pallid space reduced in extent or even wanting in ♀. In certain species the prothorax is variable in colour, the black markings gradually disappearing or becoming greatly extended, but in others it is constantly testaceous or red. The elytra, too, vary in colour, especially in the northern forms, but in the material before me the basal and subapical spots rarely show a tendency to unite into vittae. Fall's important "Review of the North American species of *Collops*" (loc. cit. pp. 249–274) was not seen by me till after the above remarks were written. We are indebted to him for the loan or gift of fifteen critical species, and his determinations of *C. tricolor*, Say, *C. 4-maculata*, F., and *C. histrio*, Er., have been accepted. The accompanying notes have been revised so as to include the valuable information thus obtained. In the subjoined table, and in the remarks on the various species, a few allied

northern or southern forms are included for comparison, the names of such insects being included within square brackets.

Key to the Mexican and Central American species of Collops.

a. Elytra oblong, densely punctate; wings fully developed.
  a[1]. Elytra unicolorous, blue, violet, or black.
    a[2]. Body more robust; legs black, femora sometimes testaceous.
      a[3]. Head uniformly punctate.
        a[4]. Second antennal joint (♂) with a long appendage.
          a[5]. Head black to anterior margin, prothorax and femora testaceous: species large [♂ unknown] . . . . *grandis*, n. sp.
          b[5]. Head (♂ ♀) testaceous in front.
            a[6]. Prothorax bimaculate on disc; testaceous portion of head angularly extending upwards; elytra blue or green: species large . *bipunctatus*, Say.
            b[6]. Prothorax vittate on disc; testaceous portion of head truncate behind; first antennal joint (♂) toothed at apex externally; elytra blue: species moderate in size. . . . . *aulicus*, Er.
            c[6]. Prothorax immaculate; elytra blue: species moderate in size.
              a[7]. First antennal joint (♂) broadly oblongo-subquadrate, concave above . . . . *paradoxus*, n. sp.
              b[7]. First antennal joint (♂) gradually widened outwards . . . . *frontalis*, Gorh.

b^4. Second antennal joint (♂) with a short, slender appendage; prothorax immaculate.

c^5. Head, elytra, and legs black . *nigripennis*, n. sp.

d^5. Head and elytra blue, femora rufo-testaceous . . . *femoralis*, Gorh.

c^4. Second antennal joint (♂) without visible appendage; head and legs black; prothorax immaculate; antennae (♂) partly testaceous.

e^5. Elytra coarsely punctate, violaceous; intermediate antennal joints (♂) strongly transverse, stout; head broad *brevicollis*, n. sp.

f^5. Elytra finely punctate, bluish black; intermediate antennal joints (♂) narrower and longer; head smaller . . [*tricolor*, Say.]

b^3. Head with a smoother subglabrous, depressed area on each side anteriorly, at least in ♂; second antennal joint (♂) with a long appendage.

d^4. Head blue to anterior margin; prothorax immaculate; antennae testaceous at base in both sexes, third joint small in ♂. . . . . *amplicollis*, n. sp.

e^4. Head testaceous in front; prothorax black on disc, or immaculate; antennae wholly testaceous, and with third joint greatly thickened in ♂ . *nigriceps*, Say.

b^2. Body rather slender; head and femora black, tibiae and tarsi testaceous; prothorax spotted or immaculate; elytra blue, finely punctate, widened posteriorly; second antennal joint (♂) with a long appendage . . . . . *parvus*, Schaeff.

b^1. Elytra blue, violaceo-fasciate before middle, the sutural edge and a triangular lateral patch testaceous; head uniformly punctate, dark; prothorax immaculate; legs black;

first antennal joint (♂) long, second with a short appendage . . . *quadricolor*, n. sp.

c^1. Elytra blue, with suture and outer limb testaceous, the prothorax and anterior femora also testaceous; head nigro-violaceous, uniformly punctate; antennae (♂) testaceous, joint 2 with a short appendage, the following joints broad and sharply serrate; elytra subtuberculate . . . . *granellus*, Fall.

d^1. Elytra each with a broad, blue or green, anteriorly constricted vitta on disc, leaving the inner and outer margins testaceous; prothorax spotted or immaculate; head uniformly punctate.

c^2. First antennal joint (♂) broad, and second with a shorter appendage. *vittatus*, Say.

d^2. First antennal joint (♂) narrow, and second with a longer appendage. . . . . *flavolimbatus*, n. sp.

e^1. Elytra cyaneous, with three transversely placed flavous spots, the common median one extending down the suture to the tip; prothorax subcordate, nigro-fasciate; head uniformly punctate. . . . . [*lebasi*, Er.]

f^1. Elytra with the base, or a patch on each, and a still larger subapical patch on disc, blue or green, for the rest rufous or testaceous, like the prothorax.

e^2. Head uniformly punctate.

c^3. Head dark to anterior margin; first antennal joint (♂) rounded at tip, the second with a short appendage.

f^4. Legs black.

g^5. Second antennal joint (♂) transverse, broadly spatulate externally: species large . . . . . *illustris*, n. sp.

h^5. Second antennal joint (♂) longer than broad, with an oblique dentiform projection arising from the base externally: species smaller. 4-*maculatus*, F.

g^4. Legs partly red; second antennal joint (♂) about as broad as long, angularly dilated at about the middle externally . [*femoratus*, Schaeff.]

d^3. Head red or testaceous in front, usually more broadly so in ♂.

h^4. First antennal joint (♂) strongly curved, sinuously excavate externally, and angulate at tip, the second bluntly dilated externally and with a very long appendage.

i^5. Elytra more coarsely punctate, shining; legs black . . . [*histrio*, Er.]

j^5. Elytra more finely punctate, dull; legs and antennae variable in colour, often wholly testaceous . . . *blandus*, Er.

i^4. First antennal joint (♂) strongly curved, simply concave externally, and rounded at tip, the second joint subangularly dilated externally.

k^5. Second antennal joint (♂) with a very long stout appendage *histrionicus*, n. sp.

l^5. Second antennal joint (♂) with a short appendage . *intermedius*, Gorh.

e^3. Head with a sharply trilobed testaceous space in front; second antennal joint (♂) with a long slender appendage.

j^4. Legs and antennae (base excepted) black; elytra dull, the blue spots large and longitudinally confluent . . . [*tibialis*, Schaeff.]

k^4. Legs (femora excepted) and antennae testaceous; elytra shining, the basal blue spots reduced to a transverse fascia . *varipes*, n. sp.

f^2. Head with a smoother, depressed, subglabrous area on each side anteriorly, at least in ♂; second antennal joint (♂) with a long appendage.

f^3. Head black to anterior margin, antennae and legs, and the body in great part, testaceous; elytra closely, finely punctured, the interspaces alutaceous, the dark markings reduced to spots . . [4-*guttatus*, n. sp.]

g^3. Head testaceous in front; elytra more densely punctured.

l^4. Elytral markings more extended: species large.

m^5. Head excavate in front and transversely tumid on each side between eyes, and anterior legs and antennae testaceous, in ♂; prothorax maculate; elytral markings greatly developed . . . *balteatus*, Lec.

n^5. Head not tumid between eyes, and with a prominent, depressed polished area on each side anteriorly, in ♂.

d^6. First antennal joint not toothed in ♂; legs and antennae variable in colour, sometimes wholly testaceous; prothorax spotted or immaculate; elytral markings large . *geminus*, Er.

e^6. First antennal joint toothed, and anterior femora testaceous, in ♂; prothorax immaculate; elytra each with two large spots . . [*ludicrus*, Er.]

m^4. Elytral markings reduced in extent, the basal fascia narrow; prothorax immaculate; legs black: species much smaller . . . . . *conspicillatus*, n. sp.

b. Elytra suboval, rather convex, roughly scabroso-punctate, black, like head and legs; wings not fully developed: species small . . . . . *nigritus*, Schaeff.

1. *Collops grandis*, n. sp.

♀. Broad, black, the elytra wholly blue or bluish-green, the head nigro-caeruleous, the labrum and clypeus, the bases of the mandibles and palpi, the first joint of the antennae, and the outer edge of the next two or three joints, the abdomen, femora, and coxae (the outer edge of the middle pair sometimes infuscate), rufo-testaceous; clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head broad, very densely, finely punctate throughout, the dark colour extending to the anterior margin; antennae with joints 1 and 2 subequal in length, 3–10 moderately serrate. Prothorax strongly transverse, shining, sparsely, minutely punctate. Elytra very densely, finely punctured.

Length 7–7½, breadth 4 mm.

Hab. Mexico, Santa Clara in Chihuahua and Chihuahua city (*Höge*).

Four females. This insect is a little larger than the largest examples of the same sex of *C. bipunctatus*, from all the varieties of which it may be distinguished by the wholly bluish-black head, the immaculate, smoother prothorax, the pallid femora and coxae, and the relatively longer second antennal joint.

2. *Collops bipunctatus*.

Malachius bipunctatus, Say, Journ. Acad. Phil. iii, p. 185; Amer. Ent. iii, and Complete Writings, i, p. 107, t. 48, fig. 5.

Collops bipunctatus, Er., Entomographien, p. 55; Horn, Trans. Am. Ent. Soc. iii, pp. 80, 82; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 113, 313; Fall, Journ. N. York Ent. Soc. xx, pp. 252, 263.

Malachius xanthostomus, Chevr., in Dej. Cat.

♂. Antennae with joint 1 very broad, subtriangular, hollowed above, convex beneath, the curved appendage on joint 2 long.

Additional localities for this species, are :—

Mexico (*Mus. Brit., Truqui; Coffin, in Mus. Oxon.*), Durango city, Mexico city, Irapuato, Jalapa (*Höge*), Orizaba, Puebla (*Sallé*), Amecameca (*Mus. Oxon.*).

A large form, with the head (a deep triangular excision in the middle in front and the anterior margin excepted) and elytra blue or (rarely) green, the prothorax rufo-testaceous, with two black spots of variable size on the disc; the elytra somewhat scabrous. The entire antennae, the sides of the head in front of the eyes, and the tarsi are

sometimes testaceous in the female. Höge sent a long series from Durango. The dark portion of the head is angularly excised in the middle in front in all the specimens before me, irrespective of sex. Fall (loc. cit.) gives the N.-American distribution as " Kansas to the desert regions of southern California," and states that he has seen specimens from Colorado, New Mexico, Utah, and Arizona. According to Mead (Amer. Nat., 1899, pp. 927–929) *C. bipunctatus* is said to destroy *Doryphora*.

3. *Collops aulicus*.

Collops aulicus, Er., Entomographien, p. 55; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 113, t. 6, figs. 21 (♂), 22 (♀).

♂. Antennae with joints 1 and 2 testaceous, streaked with black; 1 broad, subtriangular, hollowed and smooth at the apex posteriorly above, and with the outer apical angle produced into a sharp tooth; 2 very large, subangularly raised towards the apex above, the apical excavation strongly transverse, and with a very long, slender appendage.

Apparently not uncommon in Mexico, and recognisable by the broad blue vitta on the disc of the prothorax, the wholly caeruleous elytra, the blue, densely punctured, closely pubescent head, with the anterior margin in the male broadly, and in the female narrowly, testaceous, the bluish-black legs, and the testaceous abdomen. Gorham's figure of the male (21) shows the shape of the first antennal joint, but the appendage on the second is not clearly indicated.

The uniform sculpture of the head and the form of the male-antennae separate *C. aulicus* from similarly-coloured *C. nigriceps* (*eximius*). The black-legged insects from Utah and Arizona doubtfully referred by Fall to *C. marginicollis*, Lec. (Journ. N. York Ent. Soc. xx, p. 260), possibly belong here. The latter differs from *C. aulicus* in having a smoother head, and subtuberculate elytra, and joints 3–10 of the male-antennae strongly serrate and the appendage of the second joint much shorter.

4. *Collops paradoxus*, n. sp. (Plate II, fig. 1, basal joints of ♂-antenna.)

Collops tricolor, Er., Entomographien, p. 57 (♀) (1840) (part.); Gorh., Biol. Centr.-Am., Coleopt. iii. 2, pp. 113, 313, t. 13, figs. 1, 1*a* (gynand. ♀) (part.).

Malachius paradoxus, Sturm, in litt.

Bluish-black, the anterior margin of the head broadly in ♂, and narrowly in ♀, the labrum and clypeus, the bases of the palpi and mandibles, the antennae with joint 1 in both sexes, 2 in great part above, and 3 and 4 along their outer edge, in ♂, 2–4 along their outer edge in ♀, the prothorax and abdomen, rufous or testaceous, the rest of the head and the elytra violaceous or blue; clothed with fine cinereous pubescence intermixed with very long, erect, black hairs, the adpressed cinereous pubescence on the head long and conspicuous in ♂, more scattered in ♀. Head broad, densely, finely punctate; antennae (♂) with joint 1 very broad, abruptly expanded from near the base externally, oblong-subquadrate, concave above, 2 with a very long, slender, curved appendage, 3–9 moderately serrate, 3 a little wider than 4, (♀) 1 oblong-conic, 2 broad, large, rounded within, 3–5 transverse, serrate. Prothorax strongly transverse, somewhat rounded in front, shining, sparsely, minutely punctate. Elytra densely, rather coarsely punctate, bluntly rounded at the apex. Length 4½–5½, breadth 2¼–2½ mm. (♂♀.)

Hab. Mexico, (*ex coll. Sturm*), Oaxaca (*Sallé, Höge*), Parada (*Sallé*), Mochitlan in Guerrero (*Baron*), Omilteme and Xucumanatlan in Guerrero (*H. H. Smith*).

Apparently a common insect in Oaxaca and Guerrero, whence a long series has been received showing no variation. Erichson's description of this species was taken from a single Mexican example (♀) found by Deppe. The gynandromorphous ♀ from Oaxaca figured by Gorham belongs here. *C. paradoxus* is extremely like *C. frontalis*, Gorh., also from Oaxaca; but differs from it in the male sex in having a densely punctured, more pubescent head, with the testaceous coloration less extended, not reaching the eyes, the first antennal joint concave, and very broadly dilated from near the base, and the second joint with a still longer appendage. The females of the two forms are not easy to separate; but that of *C. paradoxus* may be identified by the slightly longer prothorax, and the less dilated, wholly pale first antennal joint. *C. tricolor* is a smaller insect, with less coarsely punctured elytra, and a non-appendiculate second antennal joint in ♂.

5. *Collops frontalis.*

Collops frontalis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 314.

♂. Antennae with joint 1 wholly testaceous, gradually narrowing

from the base, shaped as in ♀, but broader, 2 black at the apex above, and with a long, curved appendage, 3–7 subequal.

♀. Antennae with joints 1 and 2 subequal in width, 1 infuscate along its inner face.

Hab. Mexico, Oaxaca.

Gorham's diagnosis and general description of this species was taken from three males. He was unaware that the extended testaceous coloration of the head was peculiar to that sex. The female from Etla, labelled *C. frontalis* by him, has the anterior margin of the clypeus only testaceous.

6. *Collops nigripennis*, n. sp.

♂. Oblong, rather narrow, the head and prothorax shining, the elytra dull; the head, elytra, abdomen (the ventral sutures excepted), and legs black, the prothorax testaceous; the antennae with the first joint externally, and the second, except along the outer edge, testaceous, for the rest black; the surface finely pubescent, and also set with long, erect, scattered, blackish, bristly hairs. Head densely punctate, transversely flattened anteriorly, the eyes prominent; antennae with joint 1 strongly curved, widened outwards, longer than broad, somewhat angulate within and almost smooth externally, 2 with a short slender appendage, 3–9 feebly serrate, 3–6 subequal in length. Prothorax strongly transverse, as wide as the base of the elytra, faintly punctate. Elytra subparallel, moderately long, densely, finely punctate.

Length $3\frac{1}{10}$, breadth $1\frac{3}{4}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

One male. Narrower than *C. tricolor*; the head and elytra black; the first antennal joint (♂) strongly curved and much narrower, and the second with a slender appendage; the elytral punctuation fine and dense. The second antennal joint viewed from in front appears to be trilobate externally.

7. *Collops femoralis.*

Collops femoralis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 113, 314.

♂. Antennae with joints 1 and 2 testaceous, 2 suffused with black beneath, 1 curved, elongate-triangular, 2 with a slender, short, rudimentary appendage received beneath the reflexed inner margin of the joint, 3–9 feebly serrate, subequal.

♀. Antennae with joint 1 testaceous, oblongo-conic, rather slender,

Hab. Mexico; Guatemala.

In this species the head is nigro-caeruleous to the anterior margin, the prothorax, femora, coxae, and abdomen are rufo-testaceous, and the elytra violaceous, blue, or greenish. In two examples from Etla, Mexico, the intermediate and posterior femora are infuscate. The Guatemalan types have all three femora rufo-testaceous. The six males before me have a rudimentary appendage to the second antennal joint. *C. honestus*, Er., from the Orinoco, described from a single male, must come near *C. femoralis*; it is said to have the apices only of the femora testaceous.

8. *Collops brevicollis*, n. sp. (Plate II, fig. 2, ♂.)

Bluish-black, the labrum and clypeus, the base of the mandibles, the prothorax, and abdomen rufo-testaceous, the elytra violaceous; the antennae with joints 1 and 2 above, and 3–6 on their outer face, testaceous, for the rest black; clothed with fine cinereous pubescence intermixed with very long, erect, black, bristly hairs. Head moderately broad, densely, finely punctate, bluish-black to the anterior margin, much narrowed anteriorly; antennae (♂) with joint 1 curved, abruptly widened outwards, subsecuriform, 2 longer than broad, angularly dilated at the base and towards the apex externally, without appendage, 3–10 gradually diminishing in width, 3–9 strongly transverse, stout, serrate, (♀) joint 1 oblongo-conic, lineate with black, 2 stout, broad. Prothorax broad, strongly transverse, truncate in front, shining, sparsely, minutely punctate. Elytra coarsely, densely punctate, bluntly rounded at the apex.

Length $4\frac{1}{2}$, breadth $2\frac{1}{2}$–$2\frac{3}{4}$ mm. (♂ ♀.)

Hab. Mexico, Ciudad in Durango 8,100 feet (*Forrer :* ♂), Ventanas in Durango (*Höge :* ♀).

One pair. Near *C. paradoxus* and *C. frontalis*, differing from both of them in the non-appendiculate second antennal joint of the male, these organs being comparatively short, tapering, and conspicuously testaceo-lineate externally to near the tip in both sexes. The prothorax is very short and broad, the elytra broad and coarsely punctate. From *C. tricolor* the present species may be separated by the broad head and prothorax, and the coarsely punctured elytra; and in the male by the strongly transverse, stout intermediate joints of the antennae and the basally angulate second joint.

[*Collops tricolor.*

Malachius tricolor, Say, Journ. Acad. Phil. iii, p. 182; Amer. Ent. iii, and Complete Writings, i, p. 107, t. 48, fig. 3 (*nec* 2) (♀).

Collops tricolor, Horn, Trans. Am. Ent. Soc. iii, pp. 80, 81 (*nec* Erichson, Gorham); Fall, Journ. N. York Ent. Soc. xx, pp. 251, 256 (1912).

♂. Antennae with joint 1 broad, triangular, 2 without visible appendage, 3–9 serrate, subequal.

Hab. North America, Canada and the Middle States to Kansas.

Gorham (Biol. Centr.-Am., Coleopt. iii, 2, p. 313) has called attention to the various forms doing duty for *C. tricolor* (Say); but he does not appear to have seen N.-American examples of the insect identified by Horn as *C. tricolor*, of which there are several from Canada, etc., in the British Museum. These northern specimens, for an additional pair of which from Lyme, Conn., we are indebted to Mr. Fall, have the head wholly black; the basal two or three joints of the antennae (in both sexes) testaceous, and the others more or less infuscate; the prothorax and abdomen rufo-testaceous; the elytra very finely punctured, nigro-caeruleous, sometimes with the epipleura rufo-piceous; and the tarsi rufo- or fusco-testaceous. No appendage to the second antennal joint is visible in the four males of *C. tricolor* before me, or in that of *C. brevicollis*. This character is not mentioned by Fall in his recent revision of the N.-American *Collops*.]

9. *Collops amplicollis*, n. sp.

Bluish-black, the labrum and clypeus, the base of the mandibles, the two basal joints of the antennae above, the prothorax, and a space down the middle of the abdomen, rufo-testaceous or testaceous, the head to the anterior margin in both sexes, and the elytra, violaceous or blue, the tarsi sometimes rufo-piceous in ♀; clothed with fine cinereous pubescence intermixed with very long, erect, black, bristly hairs. Head broad, densely, finely punctate, with a slightly depressed polished space on each side near the eyes anteriorly in ♂; antennae (♂) setose, joint 1 broad, subsecuriform, smooth externally, convex, closely punctate, and suffused with black within, 2 with a long, curved, slender appendage, 3–9 transverse, subequal, (♀) joint 1 oblongo-conic, curved, rather slender. Prothorax moderately transverse, shining, very minutely, closely punctate. Elytra densely, rather coarsely punctate, conjointly rounded at the apex.

Length $4\frac{1}{4}$–5, breadth $2\frac{1}{10}$–$2\frac{1}{3}$ mm. (♂ ♀.)

Hab. Mexico (*Truqui, in Mus. Brit.; Mus. Oxon.*), Puebla (*Sallé*).

Three males and five females. Very like *C. frontalis* and *C. paradoxus*, but with the head wholly violaceous, the abdomen in part black, the prothorax less transverse and more closely punctate, and the elytra more rounded at the apex; the head with a small polished space on each side between the eyes anteriorly, the basal joint of the antennae broadly subsecuriform, and the second joint with a long slender appendage, in the male. In the female from Puebla the basal joint of the antennae is entirely testaceous and the tarsi are rufo-piceous. A small female from Ciudad in Durango (length 3¼ mm.) seems also to belong here.

10. *Collops nigriceps.*

Malachius nigriceps, Say, Journ. Acad. Phil. iii, p. 183 (1823); Amer. Ent. iii, and Complete Writings, i, p. 108, t. 48, fig. 3 (*nec* 2).

Collops nigriceps, Er., Entomographien, p. 56 (♀); Horn, Trans. Am. Ent. Soc. iii, pp. 80, 81; Fall, Journ. N. York Ent. Soc. xx, pp. 252, 262.

Collops eximius, Er., loc. cit. (♂♀); Lec., Proc. Acad. Phil. vi, p. 164.

Var. *Collops floridanus*, Schaeff., Canad. Ent. xliv, p. 185 (1912).

♂. Black, shining, the antennae, the head between their points of insertion, the base of the mandibles, and the abdomen testaceous, the prothorax and femora rufo-testaceous, the elytra bluish-green; clothed with fine cinereous pubescence intermixed with erect, long, scattered, bristly hairs. Head very minutely punctate, with a depressed, polished, glabrous space on each side before the eyes; antennae with joint 1 stout, oblong, widened from near the base, 2 with a long, slender appendage reaching to the middle of 3, 3–10 moderately serrate, rapidly tapering outwards, 3 very stout, nearly as long as 4 and 5 united, 4–9 about as long as broad. Prothorax moderately transverse, very sparsely, minutely punctate. Elytra rugulose, densely, finely punctate, bluntly rounded at the tip.

Length 5, breadth 2⅓ mm.

Hab. United States, Atlantic Coast line from Massachusetts to Florida, Gulf Coast as far as Mobile; Mexico (*Mus. Brit.*).

The above description is taken from a specimen (♂) of the var. *floridanus* received by the British Museum in 1855,

under the MS. name "*Collops saulcyi*, Ch.," and said to be from "Mexico." It has the antennae and head shaped and coloured exactly as in a typical *C. eximius* (= *nigriceps*, Say), ♂, before me from E. Florida, this latter having the legs and a large patch on the disc of the prothorax black. The testaceous, tapering antennae of the male, with unusually stout third joint, and the peculiar sculpture of the head, are the distinguishing characters of the present species. Mr. Fall has sent me a female of *C. nigriceps* from New Jersey for comparison.

11. *Collops parvus.*

Collops punctatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 316 (*nec* Leconte).
Collops parvus, Schaeff., Canad. Ent. xliv, p. 185 (1912); Fall, Journ. N. York Ent. Soc. xx, pp. 251, 256 (1912).

Depressed, black, the labrum, the base of the mandibles, the two or three basal joints of the antennae (except on their lower face in ♂), the prothorax (except a small transverse, evanescent patch on the disc, which is sometimes obsolete), abdomen, tibiae, and tarsi rufo-testaceous, the head aeneous, the elytra blue or violaceous; clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head aeneous to the anterior margin in both sexes, minutely, uniformly punctate; antennae (♂) with joint 1 widened from near the base, 2 with a long, slender, appendage, 3–5 transverse, equal, feebly serrate, 6–9 a little longer. Prothorax shining, moderately transverse, sparsely, minutely punctate. Elytra rather elongate, narrowed towards the base in both sexes, rugulose, and densely, finely punctate.

Length 3½–4, breadth 1⅔–2 mm. (♂ ♀.)

Hab. North America, Arizona, New Mexico, and S. W. Texas; Mexico, Northern Sonora (*Morrison*).

The above description is taken from seven specimens sent by Morrison, one only of which is a male. This is a rather narrow, depressed, feebly developed form, approaching *Anthocomus*. The black femora and clear rufo-testaceous tibiae and tarsi, the relatively narrow prothorax, and the finely punctured, posteriorly widened elytra, readily distinguish *C. parvus*. Fall (loc. cit., p. 256) has already called attention to the incorrect determination of the Sonoran specimens.

12. *Collops quadricolor*, n. sp.

Collops tricolor, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 113 (part.).

♂. Black, the labrum and clypeus, the bases of the mandibles and palpi, joints 1 and 2 of the antennae (the lower surface of 2 excepted), the prothorax, and abdomen testaceous, the head throughout and the elytra bluish-green, the elytra with a narrow elongate-triangular patch at about the middle of the outer margin and the inner edge of the sutural carina testaceous and a common, broad, indeterminate submedian fascia violaceous; clothed with cinereous pubescence intermixed with very long, erect, black, bristly hairs, the cinereous adpressed hairs on the head long and conspicuous. Head densely, uniformly punctate; antennae with joint 1 long, obconic, 2 with a short appendage received in the cavity beneath the reflexed inner margin, 3–9 moderately widened, subequal in width, 3 and 4 about as long as broad, 5–9 slightly longer. Prothorax transverse, shining, sparsely, minutely punctate. Elytra oblong, densely, rather finely punctate.

Length $6\frac{1}{3}$, breadth $2\frac{1}{2}$ mm.

Hab. Mexico, Oaxaca (*Höge*).

One male. It is probable that the peculiar coloration of the elytra of this insect is not constant; but assuming the elytra to be wholly blue the specimen cannot be included under *C. paradoxus* or *C. amplicollis*, and if one of the vittate-series it does not agree with *C. vittatus* or any of its allies. *C. quadricolor* is, therefore, treated as a distinct species for the present. *C. quadricolor* is the only known Mexican form with a common violaceous submedian fascia bordered externally by a narrow oblong-triangular, testaceous patch. It is about the same size as *C. paradoxus*. *C. sublimbatus*, Schaeff., has somewhat similarly coloured elytral margins.

13. *Collops granellus*.

Collops granellus, Fall, Journ. N. York Ent. Soc. xx, pp. 253, 265 (♂♀) (1912).

♂. Head around the points of insertion of the antennae, the antennae themselves, the anterior femora and coxae, and the base of the intermediate femora, testaceous; antennae stout, joint 1 broad, triangular, flattened, a little longer than wide, 2 with a short appendage which is received in repose beneath the inner reflexed

margin of the joint, 3–10 gradually tapering outwards, 3–9 sharply triangular.

Hab. Southern United States, Utah and Arizona; Mexico, Northern Sonora (*Morrison*), Monterey in Nuevo Leon (*Höge*).

Two males from Monterey and a female from Sonora belong to this species, the types of which have been kindly communicated by Mr. Fall. They are closely related to *C. limbellus*, G. & H. (= *limbatus*, Lec.), differing from that insect in having the elytra distinctly tuberculate and with the broad blue vittae extending to the tip, and the antennal joints 3–10 much stouter in the male. This last-mentioned character brings *C. granellus* near *C. vittatus*, which has less strongly serrate antennae in that sex.

14. *Collops vittatus.*

Malachius vittatus, Say, Journ. Acad. Phil. iii, p. 184; Amer. Ent. iii, and Complete Writings, i, p. 108, t. 48, fig. 1 (♂).

Collops vittatus, Er., Entomographien, p. 60 (♂♀); Lec., Proc. Acad. Phil. vi, p. 164; Horn, Trans. Am. Ent. Soc. iii, pp. 81, 83, and Proc. Calif. Acad. Sci. (2) iv. p. 329; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 316 (*nec* p. 114); Fall, Journ. N. York Ent. Soc. xx, pp. 254, 266.

Megadeuterus haworthi, Westw., Trans. Ent. Soc. Lond. ii, p. 98, t. 10, figs. 9, 9*a–e* (♂).

♂. Antennae with joint 1 and the upper side of 2 testaceous, for the rest black, in some examples wholly testaceous, 1 much widened outwards, flattened above and convex beneath, 2 abruptly excised beyond the middle externally (appearing broadly bilobed), the appendage extremely slender and received beneath the reflexed inner margin of the joint, 3–10 moderately widened, serrate, 3–8 transverse, subequal.

♀. Antennae with joint 1 and the outer edges of 2–6 testaceous, for the rest infuscate or black.

Hab. Canada; United States; Lower California; Northern Mexico, Sonora (*Morrison*), Durango city, and Villa Lerdo (*Höge*), Coahuila (*Dr. Palmer*).

A very variable insect, ranging from Canada to Northern Mexico. Examples from Coahuila and Sonora with the antennae and the anterior portion of the head testaceous

in the male appear to have the intermediate antennal joints stouter and more strongly serrate than those with darker antennae and the head wholly nigro-caeruleous. The prothorax in some specimens has a large subquadrate dark patch on the disc, but in others this is reduced to two spots or is altogether wanting. The sutural and marginal stripes on the elytra are always continuous around the apex. The extremely slender appendage of the second antennal joint of the male (not shown by Westwood in his figure 9*c*) is not easily seen. According to Fall, *C. marginellus*, Lec., from the Colorado River, may be known from *C. vittatus* by the very broadly ovate-triangular basal joint of the antennae of the male.

15. *Collops flavolimbatus*, n. sp.

Collops vittatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 114, t. 6, fig. 23 (♀) (*nec* p. 316) (*nec* Say).

Head nigro-aeneous or violaceous, the anterior margin sometimes testaceous, joint 1 of the antennae (a streak along the inner face excepted), 2 above in ♂, 2–4 along their outer edge in ♀, the labrum, clypeus, and base of mandibles, the prothorax (except two spots or streaks on the disc, which are often absent), the suture and outer margin of the elytra to the apex (more broadly so before the middle), and the ventral sutures, testaceous or rufo-testaceous, the rest of the elytra blue or bluish-green, and that of the under surface black; clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head densely, finely, uniformly punctate; antennae (♂) with joint 1 curved, gradually widened outwards, 2 angularly dilated at about the middle externally, the appendage long and slender, curving over the apex of the joint, 3–10 subequal in width, 3–9 about as broad as long. Prothorax transverse, shining, closely, minutely punctate. Elytra densely, rather finely punctate.

Length $3\frac{1}{2}$–4, breadth 2–$2\frac{1}{10}$ mm. (♂ ♀.)

Hab. Mexico (*Truqui; Coffin, in Mus. Oxon.*), Mexico city (*Höge*), Puebla, Orizaba (*Sallé*).

Nine males and seven females. This is the insect figured by Gorham under the name *C. vittatus*, from which it differs in having joints 3–10 of the antennae more slender (being about equal in width in the two sexes), the first joint of the male much narrower and streaked with black, and the second angularly dilated externally and furnished with a long slender appendage in that sex. The prothoracic markings are similarly evanescent, and the elytral

vittae vary in width, but never reach the apex. *C. flavolimbatus* is also considerably smaller than *C. vittatus*. The form of *C. confluens*, Lec., with longitudinally confluent elytral markings comes near the present species; but in *C. confluens* the head and elytra are more coarsely punctate, and the basal joint of the ♂-antennae is slender and entirely testaceous. A female of Leconte's species has been sent me by Mr. Fall. There is a specimen (♂) of *C. flavolimbatus* in the Oxford Museum labelled " N. America."

[*Collops lebasi.*

Collops lebasii, Er., Entomographien, p. 61.

Hab. Colombia (*Mus. Berol.*; *Mus. Oxon.*).

This species, of which two females (including one of Erichson's types) are before me, has the head nigro-violaceous and very finely punctate; the antennae long and stout, with joint 1, and the outer edges of 2 and 3, testaceous; the prothorax unusually long, subcordate, rufous, with a transverse ante-median black fascia; the elytra closely, rather coarsely punctate, cyaneous, with three flavous spots placed transversely before the middle—one, common, extending narrowly down the suture to the tip, the others isolated, marginal; the upper surface shining, finely, sparsely cinereo-pubescent, and also set with long erect black setae.]

16. *Collops illustris*, n. sp. (Plate II, fig. 3, basal joints of ♂-antenna.)

Black, the labrum and clypeus, the bases of the mandibles and palpi, joints 1 and 2 of the antennae (the lower surface of 2 excepted) in ♂, and 1 and the outer edges of 2–4 in ♀, the prothorax, the elytra in part, and the abdomen rufo-testaceous, the head to the anterior margin, and the elytra with the base broadly and a very large patch on the disc towards the apex, extending outwards to the lateral margin, blue or bluish green; clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head densely, finely punctate throughout; antennae (♂) with joint 1 long, curved, gradually widened outwards, 2 dilated externally into a large, broad, spoon-shaped, ciliate, hollow plate, which is followed by an angular vertical expansion of the margin, the cavity at the apex transverse, the appendage feebly developed, not extending beyond the larger cavity and with a few long hairs at the tip, 3–9 feebly serrate, 3–5 subequal. Prothorax transverse,

shining, sparsely, minutely punctate. Elytra densely, rather coarsely punctate.

Length 6–6½, breadth 2⅔–3 mm. (♂ ♀.)

Hab. Mexico, Amula, Omilteme, Xucumanatlan, and Chilpancingo, all in Guerrero (*H. H. Smith*).

Eighteen examples, including eight males. This is a large form of the variable *C. quadrimaculatus* (which occurs in the same localities in Guerrero), differing constantly in the shape of the second antennal joint of the male, the basal joint, too, in this sex is relatively more elongate and less dilated. The females are only separable from those of similarly-coloured *C. quadrimaculatus* by their larger size and broader head.

17. *Collops quadrimaculatus.* (Plate II, fig. 4, basal joints of ♂-antenna.)

Malachius quadrimaculatus, Fabr., Ent. Syst., Suppl., p. 70.

Collops quadrimaculatus, Er., Entomographien, p. 58 (exclud. synon.); Lec., Proc. Acad. Phil. vi, p. 164; Horn, Trans. Am. Ent. Soc. iii, pp. 80, 82; Gorh., Biol. Centr.-Am., Coleopt., iii, 2, p. 315; Fall, Journ. N. York Ent. Soc. xx, pp. 255, 272.

♂. Antennae with joint 1 much widened outwards, convex externally; 2 longer than broad, with a stout, oblique, long, dentiform prominence arising from the base externally, the cavity at the apex large and open, the appendage slender, received in repose beneath the reflexed inner margin of the joint, and not more than half its length.

Hab. United States; Mexico, southward to Guerrero and Oaxaca.

Fall appears to have seen very few examples of *C. quadrimaculatus*. The common Mexican insect here identified under that name agrees, however, with a male communicated by him. The specimens before me, from Indiana, Virginia and Texas (including four males), Mexico and Guatemala, have, as he describes, the second antennal joint of the male longer than broad, and the first joint much widened outwards. These examples have the head wholly violaceous or blackish, the legs black, and the second joint of the male-antenna peculiarly formed and with the appendage rudimentary. The elytral spots vary in size, the anterior one usually extending to the suture

and the larger subapical one often reaching the outer margin. The figure of the antenna is taken from a specimen from Amula, Guerrero.

[*Collops femoratus.*

Collops femoratus, Schaeff., Canad. Ent. xliv, p. 186; Fall, Journ. N. York Ent. Soc. xx, pp. 255, 272.

♂. Antennae with joint 1 strongly curved, convex within, considerably widened outwards, rounded at the outer apical angle; 2 angularly dilated at about the middle externally, the appendage short and slender.

Hab. United States, Arizona.

The antennal characters are taken from a male from Nogales sent by Mr. Nunnenmacher to the British Museum. This insect has the head wholly black, dull, and densely punctate, the two basal joints of the antennae almost entirely testaceous, the bluish-green elytral spots not reaching the outer margin, and the femora and trochanters rufo-testaceous. The southern *C. femoralis*, Gorh., is, of course, a different species.]

[*Collops histrio.*

Collops histrio, Er., Entomographien, p. 59 (♂♀); Horn, Trans. Am. Ent. Soc. iii, pp. 80, 82; Fall, Journ. N. York Ent. Soc. xx, pp. 254, 269 (*nec* Gorham).

Collops argutus, Fall, Occas. Papers Calif. Acad. Sci. viii, p. 242 (1902).

♂. Antennae with joint 1 strongly curved, sinuously hollowed externally, much widened outwards, angularly dilated at the outer apical angle; 2 bluntly dilated at about the middle externally, and with a long, stout appendage; 3–9 feebly serrate.

Hab. N. America, Upper and Lower California, New Mexico, Arizona.

The antennal characters are taken from the male from California sent me by Mr. Fall.]

18. *Collops blandus.* (Plate II, fig. 6, basal joints of ♂-antenna.)

Collops blandus, Er., Entomographien, p. 60 (♀); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 316 (♂♀).

Collops pulchellus, Horn, Trans. Am. Ent. Soc. iii, pp. 80, 83; Fall, Journ. N. York Ent. Soc. xx, pp. 254, 269.

♂. Antennae with joint 1 strongly curved, sinuously hollowed externally, much widened outwards, and angulate at the outer apical angle; 2 bluntly dilated at about the middle externally, and with a rather stout, long appendage.

Hab. North America, Arizona, Texas; Mexico (*Truqui*), Durango, Morelos, Vera Cruz, and Oaxaca.

The typical form of this species has the antennae and legs wholly testaceous; but if the shape of the basal joint of the male-antenna is to be relied upon, *C. blandus* will have to include examples with joints 3–10 of the antennae, and the legs, black. A short series from Misantla, Vera Cruz, includes all these forms, as well as *C. histrionicus* with rufo-testaceous femora, showing that the colour of the legs and antennae is variable in both insects. The type of *C. blandus*, Er., was from Mexico, that of *C. pulchellus*, Horn, from Arizona. The male of the allied *C. femoratus*, Schaeff., has the head wholly black and densely punctate, the femora red, the first antennal joint moderately widened outwards and rounded at the tip, and the second joint shaped very much as in *C. histrionicus*, but with a shorter and more slender appendage.

19. *Collops histrionicus*, n. sp. (Plate II, figs. 5, 5*a*, basal joints of ♂-antenna.)

Collops histrio, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 114, 315 (part.) (*nec* Erichson, Horn, Fall).

Moderately elongate, the head and prothorax shining, the elytra dull; head violaceous or greenish, rufous or testaceous in front in ♂, more narrowly so in ♀, the palpi and antennae black, the two basal joints of the latter in great part testaceous, the basal joint sometimes immaculate; prothorax rufo-testaceous, immaculate; elytra rufo-testaceous, each with a large basal spot (reaching the suture and outer margin) and a still larger subapical one (reaching the outer margin) blue or bluish-green; legs black, the femora rarely (one specimen from Misantla), and the anterior trochanters frequently, testaceous; abdomen rufescent, the rest of the under surface in great part black; clothed with fine cinereous pubescence intermixed with an abundance of long, erect, blackish, bristly hairs. Head closely, minutely, uniformly punctate. Prothorax transverse, convex, very sparsely, minutely punctulate. Elytra densely, moderately coarsely punctate.

♂. Antennae with joint 1 strongly curved, moderately widened

outwards, convex within, rounded at the outer apical angle; 2 broader than long, angularly dilated at about the middle externally, and with a very long, stout, strongly retractile appendage, the matted pencil of long hairs at the tip of the latter in repose curving round to the lower surface at the apex of the joint; 3–9 feebly serrate, subequal.

Length 3½–4½ mm. (♂ ♀.)

Hab. Mexico, Northern Sonora, Chihuahua, Vera Cruz, Oaxaca, Chiapas; Guatemala, San Geronimo, etc.

Not uncommon in Mexico and Guatemala. The specimens quoted by Gorham from Panama belong to his *C. intermedius*, those from Etla and Ventanas, Mexico, to *C. 4-maculatus*, and the others to the present species. The latter is extremely like *C. 4-maculatus*, but is separable therefrom by the differently shaped first and second joints of the male-antenna, and the very elongate, stout appendage to the second joint. The head is always testaceous between the points of insertion of the antennae in the male, the pale border being much narrower in the female. The elytral spots vary in size. One specimen (♂), amongst several from Misantla, Vera Cruz, has the femora testaceous, as in *C. femoratus*, Schaeff. (a male of which from Nogales is before me), from Arizona, the latter having a more closely punctate, dull, black head, and the basal joints of the antennae differently shaped. A large male from Guatemala city, apparently belonging here, is almost as shining as *C. geminus*, from which it differs in the uniformly punctured head. *C. histrionicus* is, in fact, one of several very closely allied, similarly coloured forms, which can only be satisfactorily identified by the structure of the male antenna. Mr. Fall has been kind enough to send me a pair of the species identified by him as *C. histrio*, Er., from the same region as the type, California, and there is no reason to doubt the correctness of his identification. The true *C. histrio* has more coarsely punctate elytra than *C. histrionicus*, and the first joint of the male-antenna excavate posteriorly and angularly dilated at the outer apical angle (as in *C. blandus*), and the second joint subangularly dilated at about the middle externally. *C. scutellatus* and *C. similis*, Schaeff., from Texas and Utah respectively, both based on insufficient material, are unknown to me; but they are not likely to be conspecific with the insect here described under the name *C. histrionicus*.

20. *Collops intermedius.*

Collops intermedius, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 315 (♂♀).

♂. Antennae with joint 1 curved, much widened outwards, rounded at tip; 2 with a short, slender appendage, which is entirely received in repose in the large cavity.

Hab. Panama, Chiriqui, Panama.

Extremely like *C. histrionicus*, but distinguishable therefrom by the shorter and more slender appendage of the second antennal joint of the male. The head in both sexes is testaceous between the points of insertion of the antennae. The basal joint of the latter is streaked with black in the female and sometimes in the male also. The more shining surface, deeper colour, and less densely punctate elytra, characters relied upon by Gorham, are of no value, when series of the two forms are compared. The head is somewhat deeply transversely depressed anteriorly in the male, obsoletely so in the female. A female from Los Frailes, Costa Rica (*Mus. Brit.*), with entirely dark head, may belong here.

[*Collops tibialis.*

Collops tibialis, Schaeff., Canad. Ent. xliv, p. 186; Fall, Journ. N. York Ent. Soc. xx, pp. 254, 271.

♂. Antennae with joint 1 curved, moderately widened outwards, convex within, rounded at the outer apical angle; 2 broader than long, angularly dilated at about the middle externally, the appendage long and slender.

Hab. United States, Arizona and New Mexico.

Antennal characters taken from a male from Chiricahua Mts., Arizona, sent by Mr. Fall. This insect has the yellow anterior portion of the head trilobate behind, and the large blue elytral spots longitudinally confluent.]

21. *Collops varipes*, n. sp.

♂. Rather short, shining, nigro-caeruleous, the head around and between the points of insertion of the antennae and in the middle anteriorly, the labrum and clypeus, the bases of the mandibles and palpi, the antennae, the prothorax, the elytra in part (except a rather broad, common fascia at the base, and a large subapical spot reaching the outer margin), the abdomen, tibiae and tarsi

testaceous, the rest of the elytra violaceous; clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head densely, very finely punctate, transversely depressed in front; antennae with joint 1 broadly widened outwards, curved, convex within, 2 transverse, subangularly dilated externally, with a very long, slender, curved appendage, 3–9 transverse, subequal, feebly serrate. Prothorax transverse, minutely punctate. Elytra comparatively short, densely, rather finely punctate.

Length $3\frac{1}{10}$, breadth $1\frac{4}{5}$ mm.

Hab. Mexico, Acapulco (*Höge*).

One male. A small, comparatively short form, approaching *C. histrionicus* and *C. blandus*, with testaceous antennae, prothorax, tibiae, and tarsi, and nigro-caeruleous femora, the testaceous anterior portion of the head trilobed, the elytra somewhat finely punctate and with the rather narrow, common, violaceous basal fascia truncate behind. The antennae are slightly infuscate towards the tip and the appendage of the second joint is very long and slender. *C. tibialis*, Schaeff., from Arizona and New Mexico, is a nearly allied insect, with a longer, narrower, and less sinuate basal joint to the male-antenna, the elytra less shining, etc.

[*Collops quadriguttatus*, n. sp.

♂. Rather elongate, shining, testaceous, the head to the anterior margin and sterna black, the scutellum and elytra each with a large patch at the base and a still larger one on the disc towards the apex, neither of them reaching the suture or outer margin, nigro-caeruleous, the posterior femora and tibiae slightly infuscate; sparsely clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head sparsely, minutely punctate, depressed and smoother on each side before the eyes; antennae long, joint 1 strongly curved, much widened outwards, hollowed externally, 2 with a very long, curved appendage, 3–10 decreasing in width, longer than broad, 3 acutely serrate. Prothorax large, transverse, very sparsely, minutely punctate. Elytra closely, finely punctate, the interspaces between the punctures densely alutaceous.

Length 5, breadth $2\frac{1}{3}$ mm.

Hab. California (*Mus. Brit.*).

One male. This N.-American insect was received many years ago by the British Museum, and as it cannot be identified with any of the species enumerated by Fall,

I have ventured to name it. The excavate, antero-lateral portions of the head bring it near *C. geminus*, and the pale limbs are suggestive of typical *C. blandus* (*pulchellus*). From all the varieties of *C. geminus* the present species may be separated by the more sparsely punctate elytra and the wholly black, comparatively smooth head. *C. scutellatus*, Schaeff., based on a single male from Texas, is somewhat similarly coloured, but, according to Fall, it has a feebly dilated subcylindrical basal joint to the antennae.]

22. *Collops balteatus.*

Collops balteatus, Lec., Proc. Acad. Phil. vi, p. 230; Horn, Trans. Am. Ent. Soc. iii, pp. 80, 83; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 315; Fall, Journ. N. York Ent. Soc. xx, pp. 255, 273.

♂. Head canaliculate on vertex, broadly hollowed in front (appearing transversely tumid on each side between the eyes) and also with a large depressed, smoother area on each side anteriorly; antennae with joint 1 curved, broadly widened from near the base, convex above, 2 with a very long appendage; anterior legs in great part testaceous.

♀. Head flattened anteriorly, without smoother depressed lateral area; legs black.

Hab. United States, Texas; Mexico (*Mus. Brit.*), Tampico (*Haldeman, sec. Leconte*); Nicaragua, Managua (*Sallé*).

I have seen six specimens of this species, one only of which is a male. *C. balteatus* comes very near some of the varieties of *C. geminus*, but it may be separated from them by the form of the anterior portion of the head in the male. The head is black, with an angularly excised testaceous space in front; the prothorax has two large black spots on the disc, which are often coalescent; the blue patches on the elytra are much more extended, usually leaving only a narrow transverse ante-median fascia, and the suture and outer limb, rufo-testaceous. The Managua example (♀) was referred by Gorham to *C. geminus*.

23. *Collops geminus.*

Collops geminus, Er., Entomographien, p. 58 (♀); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 113, 314 (part.).

Collops decorus, Er., loc. cit. p. 59 (♂); Gorh., loc. cit. p. 114.

Collops validus, Horn, Trans. Am. Ent. Soc. iii, pp. 80, 82, fig. (♂), and Proc. Calif. Acad. Sci. (2) iv, p. 329; Gorh., loc. cit. p. 314; Fall, Journ. N. York Ent. Soc. xx, pp. 254, 268.

♂. Antennae with joint 1 curved, widened from near the base, 2 with a very long, curved appendage, 3–9 feebly serrate, 3 a little longer than 4.

Hab. Lower California; Mexico; Guatemala; Nicaragua; Venezuela.

A large, variable form, with quadrimaculate elytra, distinguishable amongst its allies by the concave, smoother, subglabrous space on each side of the head anteriorly, this being especially conspicuous in the male. The testaceous portion of the front of the head is equally developed in the two sexes, and always angularly excised in the middle. *C. geminus* has two evanescent black spots on the prothorax, and the anterior femora in some examples rufo-testaceous; *C. decorus* has an immaculate prothorax and the legs sometimes in part testaceous; *C. validus* has the prothorax spotted or immaculate, and the legs wholly or in part, and the abdomen, testaceous. The male-antenna (of *C. validus*) has been figured by Horn. Gorham, for want of material, left the determination of *C. decorus* as somewhat doubtful. The pale-legged form (*C. validus*), the type of which was from Yaqui in Sonora, has been found at Acapulco and Mazatlan by Höge, and at Presidio and Milpas in Durango by Forrer, all these localities being in N. Mexico. The elytra usually have the outer limb testaceous from a little below the shoulder, but in one specimen the second spot reaches the outer margin.

[*Collops ludicrus.*

Collops ludicrus, Er., Entomographien, p. 60 (♀).

♂. Head broadly depressed in front and with a shallow depressed smoother area on each side anteriorly; antennae with joint 1 strongly curved, broadly widened, and armed with a small tooth on the inner edge towards the apex, 2 with a very long, curved appendage, 3–9 subequal, moderately serrate; anterior femora rufo-testaceous.

♀. Head flattened anteriorly; legs black.

Hab. Antilles, St. Domingo.

There is a pair of this species in the British Museum, the male being now described for the first time. *C. ludicrus* resembles *C. geminus*, var. *decorus*, in colour, except that the blue elytral spots are rather smaller; but is easily recognisable by the toothed basal joint of the antennae of the male. The testaceous portion of the head is similarly excised in the middle in both sexes, but the depressed area on each side in front is shallow and inconspicuous. The male of *C. dux*, Fall, from Texas, appears to have a similarly formed basal joint to the antennae.]

24. *Collops conspicillatus*, n. sp. (Plate II. figs. 7, 7*a*, ♂.)

♂. Black, the base of the mandibles, the inter-antennal portion of the head, the basal joint of the antennae (except a broad streak along the upper face), the concave upper portion of the second joint, the prothorax, the elytra in part (except a narrow common fascia at the base and a large subapical patch not reaching the outer margin), and abdomen rufo-testaceous, the rest of the elytra blue or violaceous and that of the head bluish-black; clothed with fine cinereous pubescence intermixed with long, erect, black, bristly hairs. Head (fig. 7*a*) densely, finely punctate, with a polished, aeneous, subglabrous, concave space on each side anteriorly; antennae with joint 1 curved, moderately widened outwards, 2 with a very long, slender, curved appendage, 3–9 feebly serrate, subequal in width. Prothorax shining, broad, transverse, sparsely, minutely punctate. Elytra densely, rather coarsely punctate.

Length $4\frac{3}{4}$, breadth $2\frac{1}{8}$ mm.

Hab. Mexico, Omilteme in Guerrero, 8,000 feet (*H. H. Smith*).

Four males. This species agrees with *C. geminus* (*decorus*) in having a concave, smoother, subglabrous space on each side of the head anteriorly; but in general appearance it is more like *C. histrionicus*, except that the prothorax is broader and the blue basal portion of the elytra is much less developed.

25. *Collops nigritus*.

Collops nigritus, Schaeff., Canad. Ent. xliv, p. 185 (♂); Fall, Journ. N. York Ent. Soc. xx, pp. 252, 259 (♂).

♀. Opaque, somewhat convex, black, the labrum, the base of the mandibles, the basal joint of the antennae in part and the outer

edge of the second, the prothorax, and the outer margins of the ventral segments rufo-testaceous, the anterior femora piceous; clothed with cinereous pubescence intermixed with very long, coarse, erect, black, bristly hairs. Head very densely punctate; antennae with joints 3–9 subequal in length, 2 stout, subtriangular. Prothorax transverse, closely, minutely punctate. Elytra rather convex, somewhat oval, densely, coarsely, scabroso-punctate.

♂. Antennae with joint 1 strongly curved, rather long, moderately widened and somewhat flattened outwards, subangulate at about the middle within; 2 broader than long, angularly dilated at the base externally, and with a long slender appendage; 3–10 moderately serrate.

Length $3\frac{3}{4}$, breadth $1\frac{2}{3}$ mm.

Hab. Mexico, Northern Sonora (*Morrison*).

One female, found mixed with the specimens identified by Gorham as *C. punctatus*, Lec., the others belonging to *C. parvus*, Schaeff. A peculiar form, with roughly punctured, somewhat oval, black, coarsely setose elytra, an opaque closely punctate head and prothorax, etc. Mr. Fall has been kind enough to lend me a male of *C. nigritus*, and there can be no doubt as to the determination of the species, the female of which has not been described. The wings are imperfectly developed or absent, as in the allied *C. cribrosus*, Lec. The ♂-characters are taken from the Arizona example before me. *C. punctatus*, Lec., has a smoother prothorax, more parallel, metallic elytra, a less transverse second antennal joint in the male, etc.

Attalus.

Attalus, Erichson, Entomographien, p. 89 (1840); Horn, Trans. Am. Ent. Soc. iv, pp. 109, 110 (figs.), 119 (1872); Gorham, Biol. Centr.-Am., Coleopt. iii, 2, pp. 118, 318 (part.); Abeille de Perrin, Ann. Soc. Ent. Fr. 1890, pp. 364, 400.
Anthocomus, sect. II, III, Erichson, loc. cit. pp. 100, 101.
Acletus, Leconte, Proc. Acad. Phil. 1852, p. 167.
Scalopterus, Motschulsky, Bull. Mosc. 1859, p. 406.
Anthocomus, Gorham, loc. cit. pp. 114, 317 (part.).
Ebaeus, Gorham, loc. cit. p. 120 (part.).

A holarctic genus including a large number of Central American forms. All the Central American *Attali* (*A. fuscescens* = *calcaratus* excepted) are left where Gorham

placed them, but his *Anthocomi*, *A. discimacula* excepted, belong to *Attalus* (type *A. lusitanicus*, Er.) as here understood, and his *Ebaeus aeneovirens* also. The key to the identification of the fifty-two species here dealt with is mainly based upon the colour, sculpture and vestiture of the elytra, so as to include both male and female, one sex or the other of many of them not being represented in the material before me. The colour of the head, prothorax, and legs is often variable, and that of the head and legs sometimes differs sexually; characters taken from these portions of the insect are, therefore, apt to be misleading. Gorham called attention to the peculiarly shaped trochanters of the male of *A. caraboides* (suggestive of certain species of Silphidae), and to the apically elongated posterior tibiae of the female of *A. fuscescens* (= *calcaratus*), an insect here transferred to *Anthocomus*; but the last-mentioned character is still present in one species of *Attalus*, *A. varicus*. *A. coelestinus* and *A. mexicanus* (like *Tanaops*, Lec.), want the upper lobe to the second anterior tarsal joint of the male, but they can remain for the present under *Attalus*. *A. nitidiceps*, *A. connexus*, etc., have an elongated head as in *Tanaops*, but they have the antennae inserted near the anterior margin of the head. Eighteen of the twenty-seven new species now added are represented by single examples showing that many others must occur in the region. The names of two species described by Gorham (*sericans* and *limbatus*) are preoccupied for European forms and have to be changed.

Key to the Mexican and Central American species of Attalus.

a. Anterior tarsi of ♂ with joints 1 and 2 thickened, oblique, 2 lobed above, 2 and 3 freely articulated.

a[1]. Anterior tarsi of ♂ with joints 1 and 2 clearly separated; posterior tibiae of ♀ sometimes slightly produced at inner apical angle (*A. nigroaeneus* and *A. laevifrons*.)

a[2]. Elytra depressed or feebly convex to near apex, usually narrower and less dilated posteriorly in ♂.

a[3]. Elytra not plicate or carinate laterally; palpi slender.

a^4. Head more or less elongated behind the eyes.
  a^5. Body not uniformly coloured above.
    a^6. Elytra violaceous; legs black; head narrow . . *nitidiceps*, n. sp.
    b^6. Elytra testaceous, each with the base and a large oval patch violaceous.
      a^7. Head oblong; legs comparatively stout; tibiae and tarsi clear testaceous: species larger . *connexus*, n. sp.
      b^7. Head subovate; legs slender; knees only testaceous: species small [♂ unknown] . *ovaticeps*, n. sp.
  b^5. Body uniformly coloured above, black or aeneous (the anterior portion of head, and sometimes the outer limb of elytra also, flavescent in *A. malachioides*).
    c^6. Head entirely dark; legs black or piceous.
      c^7. Elytra scabrous and subopaque, densely pubescent and hirsute; prothorax densely punctate [♂ unknown] . . *gorhami*, n. n. [*sericans*, Gorh.].
      d^7. Elytra finely punctate, shining, the longer hairs fine; prothorax polished . . . . *nigritulus*, Gorh.
    d^6. Head sharply flavo-marginate in front; legs pale; elytra densely punctulate; prothorax shining . *malachioides*, n. sp.
b^4. Head shorter, transverse as seen from above.
  c^5. Body not uniformly coloured above.

e^6. Elytra black, long, opaque, setose; prothorax testaceo-marginate.
  e^7. Prothorax shining: species large . . . *plagiatus*, Gorh.
  f^7. Prothorax opaque: species smaller [♂ unknown] . . . . . *opacipennis*, n. sp.
f^6. Elytra metallic.
  g^7. Elytra shining, violaceous (a small faint streak at the sides excepted), setose and closely pubescent; antennae long and stout . . . . . *byssinus*, Er.
  h^7. Elytra shining, green, finely pubescent; head and prothorax testaceous . . . . . *aeneopicipennis*, Gorh.
  i^7. Elytra duller and more rugose, violaceous or nigro-caeruleous, finely pubescent; head black.
    a^8. Epistoma (♀) tumid [♂ unknown] . . *hepburnius*, Gorh.
    b^8. Epistoma (♀) flattened [♂ unknown] . . *crux-nigra*, n. sp.
g^6. Elytra testaceous, with violaceous spots; prothorax rufescent; antennae very elongate in ♂: species large . . . *forticornis*, n. sp.
h^6. Elytra testaceous, with black spots.
  j^7. Prothorax nigro-bimaculate or almost wholly black; upper surface densely, finely punctate.
    c^8. Prothorax ample, nearly or quite as wide as elytra . . *maculosus*, Gorh.

d^8. Prothorax small, much narrower than elytra [♂ unknown] . . *sexguttatus*, n. sp.

k^7. Prothorax rufescent; upper surface more shining, more sparsely punctate [♂ unknown] *pusillus*, Gorh.

i^6. Elytra violaceous, with apex yellow . . . . *teapanus*, n. sp.

j^6. Elytra red, often black at base . . . . . *rufipennis*, Gorh.

k^6. Elytra red, with base violaceous . . . . . *nigricornis*, n. sp.

l^6. Elytra fuscous or metallic, with suture in part or entirely, and sometimes outer limb also, testaceous or whitish.

l^7. Elytra very densely punctate, scabrous, dull [♂ unknown] . . . *scabripennis*, n. sp.

m^7. Elytra densely, finely punctate, finely pubescent.

e^8. Femora testaceous at base; upper surface rather dull, dorsal portion of elytra blackish: species large . . . . *verberatus*, Gorh.

f^8. Femora black at base; upper surface shining; dorsal portion of elytra violaceous: species very small . *albomarginatus*, n. sp.

n^7. Elytra more sparsely punctate, shining.

g^8. Upper surface conspicuously nigro-setose; prothorax flavo-marginate . . *albolimbatus*, n n. [*limbatus*, Gorh.].

h^8. Upper surface finely pubescent, setae inconspicuous.

a^9. Dorsal portion of elytra fuscous or fusco-violaceous; prothorax flavo-marginate . . *cinctus*, Lec.

b^9. Dorsal portion of elytra green; prothorax maculate on disc . . . *viridivittatus*, n. sp.

m^6. Elytra testaceous, with an anteriorly evanescent (except in dark var.) fuscous dorsal vitta; abdomen largely exposed, last dorsal segment deeply foveate in ♂; upper surface nigrosetose . . . *tabogensis*, Gorh.

n^6. Elytra testaceous, with a common, elongate-triangular, aeneous scutellar patch . . . . . *scutellaris*, Gorh.

o^6. Elytra testaceous, dull, setose . . . . . *anthobioides*, Gorh.

p^6. Elytra black or piceous, flavo-fasciate.

o^7. Elytra somewhat convex, very shining; legs not wholly testaceous [♂ unknown] . . . . *subfasciatus*, Gorh.

p^7. Elytra flatter and less shining; legs testaceous.

i^8. Head very broad, and antennae elongate in ♂; prothorax ample *megalops*, n. sp.

j^8. Head small, and antennae very short, in ♂; prothorax short. *debilicornis*, n. sp.

q^6. Elytra black, fusco-violaceous, or purplish, sparsely, minutely punctate, glaucous or opalescent, with, at most, the outer margin or apex pale.

q^7. Elytra unicolorous [♂ unknown] . . . . *sapphirinus*, Gorh.

r^7. Elytra with outer limb and apex flavescent [♂ unknown] . . . *glaucus*, n. sp.

s^7. Elytra with outer limb only flavescent [♂ unknown] . . . . . *opalinus*, Gorh.

d^5. Body uniformly coloured above; legs in part or entirely infuscate.

r^6. Body black, the elytra at most, faintly metallic, shining.

t^7. Anterior legs in part and base of antennae testaceous; elytra sparsely punctulate, black . . *laeviusculus*, n. sp.

u^7. Legs wholly piceous; antennae darker; elytra with faint brassy lustre.

k^8. Posterior tibiae strongly bowed; eyes prominent; vertex grooved; elytra sparsely punctulate [♂ unknown] *sulcifrons*, n. sp.

l^8. Posterior tibiae straighter; eyes not prominent; vertex not grooved; elytra closely punctate [♂ unknown] . . . *atratus*, n. sp.

s^6. Body aeneous or greenish, the prothorax at least shining; legs (except in *A. laticollis*) in great part or entirely testaceous.

v^7. Trochanters of ♂ spiniform or spatuliform . *caraboides*, Gorh.

w^7. Trochanters of ♂ (at least in *A. nigroaeneus*) simple.

m^8. Elytra with intermixed long, erect hairs, the punctuation very fine and close; surface shining.

c^9. Legs in part testaceous, femora infuscate . . . *nigroaeneus*, Gorh.

d^9. Legs wholly testaceous [♂ unknown] *laevifrons*, n. sp.

n^8. Elytra without erect hairs, the pubescence whitish, the punctuation dense; surface duller; legs dark . *laticollis*, Er.

t^6. Body plumbeous or olivaceous, wholly opaque and densely, minutely scabroso-punctate above; legs dark.

x^7. Head narrow; elytra widened posteriorly [♂ unknown] . . . *plumbeus*, n. sp.

y^7. Head broad; elytra longer and subparallel [♂ unknown] . . . *olivaceus*, n. sp.

b^3. Elytra simply plicate laterally, red, with base and subapical spot black; palpi stout . . . . *plicatus*, n. sp.

c^3. Elytra sharply carinate laterally, red, with base only black; palpi stout . . . . . *carinatus*, Gorh.

b^2. Elytra convex and dilated posteriorly in both sexes, metallic; palpi stout.

d^3. Body elongate.

c^4. Upper surface brilliant golden-green, front of head and legs testaceous: species large [♂ unknown] . . . . . *viridimicans*, n. sp.

d^4. Upper surface dull, uniformly brassy; femora infuscate: species small [♂ unknown] . *chalceus*, n. sp.

e^3. Body short; upper surface in part or entirely aeneous.

e^4. Head, prothorax, and elytra aeneous or greenish; elytra coarsely punctate . . . . *aeneovirens*, Gorh.

f^4. Head in part, and margins of prothorax completely flavous, elytra aeneous, more finely punctate . . . . . *flavomarginatus*, n. sp.

b^1. Anterior tarsi of ♂ with joints 1 and 2 apparently fused; posterior tibiae produced into a long spine in ♀, and slightly produced at tip in ♂; palpi slender; elytra even, red, nigro-maculate at base . . . . . *varicus*, n. sp.

b. Anterior tarsi of ♂ with joints 1 and 2 thickened, oblique, 2 not lobed above, 2 and 3 freely articulated; palpi slender; elytra metallic, violaceous or green [? *Tanaops*, Lec.].

c^1. Basal joint of anterior tarsi (♂ ♀) short, 3 thickened in ♂; elytra conspicuously nigro-setose . . . . . *coelestinus*, Gorh.

d^1. Basal joint of anterior tarsi (♂ ♀) longer, 3 not thickened in ♂; elytral vestiture finer . . . . . *mexicanus*, Pic.

1. *Attalus nitidiceps*, n. sp. (Plate II, fig. 8, ♂.)

Elongate, widened posteriorly, shining; black, the clypeus and mandibles, the anterior portion of the head in ♂ (leaving the posterior limit of the pallid coloration sharply tridentate), the sides of the front in both sexes, the basal joints of the antennae in part, the prothorax (except a broad median vitta or oblong patch on the disc), the coxae and trochanters, and the base of the femora and of the anterior tarsi and the anterior tibiae in part in ♂, testaceous, the head aeneous, the elytra violaceous, the tarsi and tibiae piceous; finely pubescent and also set with scattered erect hairs. Head longer than broad, narrow in ♀, the exposed post-ocular portion as long as the eyes, polished, very sparsely, minutely punctulate, the front broadly excavate and shallowly bifoveate; antennae moderately long, shorter in ♀, rather slender. Prothorax as long as broad, narrow, very sparsely, minutely punctulate. Elytra long, much broader than the prothorax, widened to the apex, the latter

bluntly rounded in ♀ and obliquely subtruncate in ♂; closely, finely punctate. Legs long and slender.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, nearly reaching the apex of 3, fringed with closely packed minute black setae at the tip beneath.

Length (excl. head) 2¾–3 mm. (♂ ♀.)

Hab. Mexico (*Truqui, in Mus. Brit.:* ♂ ♀), "Temisco" [? Temascala in Puebla] (*Mus. Oxon.:* ♀).

One male and three females. Near *A. connexus*, but with the exposed basal portion of the head less developed, a narrower prothorax, wholly violaceous elytra, and more slender darker legs; the head and femora are differently coloured in the two sexes. The head in this species and *A. connexus* is elongated much as in the N.-American genus *Tanaops*; but the antennae in the latter are inserted much nearer the eyes and at a considerable distance from the anterior margin of the head. The specimen from "Temisco" in the Hope Museum at Oxford is a small female with the head a little less developed than in the types.

2. *Attalus connexus*, n. sp. (Plate II, figs. 9, 9*a*, ♂.)

Moderately elongate, widened posteriorly, shining; black, the clypeus, the sides of the head in front, the antennal joints 1–5 externally, the prothorax (an oval spot on the disc excepted), the elytra with the outer limb, apex, and a common, transverse, angulate, interrupted, median fascia, the latter extending down the suture to the tip (enclosing a large, oval, subapical metallic patch on the disc), the trochanters in part, the tibiae, tarsi, and abdomen testaceous or flavo-testaceous, the rest of the elytra bluish-green; sparsely clothed with short cinereous pubescence intermixed with longer, erect hairs. Head elongate (the post-ocular portion greatly developed, the eyes thus being distant from the prothorax), polished, very sparsely and minutely, the base densely, punctulate, the front slightly hollowed between the eyes; antennae moderately long. Prothorax about as long as broad, convex, minutely punctulate. Elytra long, wider than the prothorax at the base, much widened posteriorly, abruptly declivous at the apex, the apices separately rounded, closely, finely punctate. Legs rather stout, the posterior tibiae feebly curved.

♂. Anterior tarsi with the prolonged upper portion of joint 2 narrow, reaching the apex of 3.

Length (excl. head) 2⅝–3 mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

Two males. Recognisable by the prolonged post-ocular portion of the head, the rather stout legs, the testaceous tibiae and tarsi, and the arrangement of the bluish-green elytral markings, the very large, oval, subapical spot being connected with the common basal fascia by a narrow line on the disc. This species belongs to Horn's first section of the genus and must come near *A. oregonensis*. The head is polished and almost smooth between the eyes.

3. *Attalus ovaticeps*, n. sp. (Plate II, fig. 10, ♀.)

♀. Moderately elongate, slender, widened posteriorly, shining; black, the anterior half of the head, the basal joints of the antennae (the upper side of joint 1 excepted), the prothorax (a narrow elongate streak on the disc excepted), anterior trochanters, knees, and tibiae and tarsi in part, rufescent or testaceous; the elytra with a common basal fascia and a very large oval patch on the disc (occupying about half the length of each elytron and extending outwards to the lateral margin), these markings subcoalescent at the middle, bluish-green, and the rest of their surface flavo-testaceous; finely pubescent. Head greatly developed behind the eyes, subovate, minutely punctulate, bi-impressed in front, the eyes not prominent; antennae short, slender, joints 5–10 not much longer than broad. Prothorax transverse, convex, broader than the head, much rounded at the sides; polished, very sparsely, obsoletely punctulate. Elytra a little broader than the prothorax, gradually widened posteriorly, leaving the last two abdominal segments exposed; transversely rugulose and finely punctate. Legs very slender; posterior tibiae almost straight.

Length (excl. head) $2\frac{1}{6}$ mm.

Hab. Mexico, La Noria in Sinaloa (*Höge*).

One female. This insect has the elytra coloured as in *A. connexus* (except that the large oval patch is extended to the outer margin); from which it differs in its less elongate, subovate head, the more rounded sides of the prothorax, the slender legs and antennae, the slender build, and the much smaller size.

4. *Attalus gorhami*, n. n.

Attalus sericans, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 118 (*nec* Erichson).

Hab. Guatemala, Vera Paz.

The unique type of this peculiar species is a female. It has the general facies of a *Dasytes*, and may be known

by its greenish-aeneous colour, and the dense, cinereous pubescence intermixed with very long, erect bristly hairs, these latter extending to the legs also; the head (incorrectly described as subrostrate) is much prolonged behind the eyes; the elytra are so densely punctate as to appear dull and scabrous, the numerous setigerous impressions giving a speckled appearance to the surface. *Anthocomus sericans*, Er. (1840), is an *Attalus*, and the specific name used by Gorham is therefore preoccupied.

5. *Attalus nigritulus*.

Attalus nigritulus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 120.

Moderately elongate, narrow (♂), broader and more widened posteriorly in ♀, shining; black, the elytra usually with a faint brassy or greenish lustre, the basal joints of the antennae externally, and the two basal joints of the anterior tarsi in ♂, testaceous, the legs piceous; sparsely pubescent, the elytra with intermixed, erect, longer hairs, similar to those on the exposed portion of the abdomen. Head reflexed in repose, considerably produced behind the eyes, broader in ♂ than in ♀, polished, very sparsely, obsoletely punctate, the inter-ocular portion flattened or depressed; eyes large. Prothorax narrower than the elytra, not much broader than long, convex, polished, almost smooth. Elytra moderately long, much wider than the prothorax, rugulose, closely, finely punctate. Legs long and slender; posterior tibiae bowed in both sexes.

♂. Antennae elongate, distinctly serrate; anterior tarsi with the prolonged upper portion of joint 2 reaching the apex of 3.

♀. Antennae more slender, much shorter, the outer joints a little longer than broad, 11 more elongate.

Length 2–2½ mm. (♂ ♀.)

Hab. Mexico, Cordova (*Sallé*, *Höge*), Jalapa, San Juan Bautista (*Höge*), Teapa (*H. H. Smith*).

Not uncommon in Mexico. Gorham's description was made from dirty female examples. The male is very like a *Dasytes*. In one specimen of this sex the apices of the elytra are compressed and subacuminate, but this is partly due to shrinkage after death. The elytra vary a little in length, and the head in one of the females named by Gorham is much elongated, as seen detached from the prothorax. The longer head separates *A. nigritulus* from various allied forms.

6. *Attalus malachioides*, n. sp.

♂. Elongate, narrow, shining; aeneous, the mouth-parts, the anterior margin of the head to between the eyes on each side, a small spot on the epistoma, the hind angles of the prothorax narrowly, the coxae, trochanters, and legs (a streak along the upper edge of the femora and the apices of the tibiae and tarsi excepted), and sometimes the outer limb and apex of the elytra also, testaceous or flavous; finely pubescent, with intermixed longer bristly hairs. Head considerably elongated behind the eyes, including the latter as wide as the prothorax, polished, excessively minutely punctulate, bifoveate in front, the eyes large; antennae long, feebly serrate, joints 3 and 4 subequal in length, 5–11 more elongate. Prothorax slightly broader than long, moderately rounded at the sides, polished, obsoletely punctulate. Elytra long, subparallel, a little wider than the prothorax; densely, very minutely punctate. Posterior tibiae bowed.

Anterior tarsi with the prolonged upper portion of joint 2 reaching the apex of 3.

Length 2⅓ mm.

Hab. Mexico, Cordova (*Höge*).

Two males, one of which has the outer limb and apex of the elytra flavous. The insect is not very closely allied to any of the other species enumerated in the present paper. It has the head basally elongated and the elytra subparallel much as in the same sex of *A. nigritulus*, Gorh. The metallic aeneous colour, the polished head, with sharply defined flavous anterior margin, the rather long, polished prothorax, the very densely sculptured elytra, and the pallid legs are characteristic.

7. *Attalus plagiatus.*

Anthocomus plagiatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 115.

♂. Anterior tarsi with joints 1 and 2 testaceous, 2 prolonged above into a stout lobe which reaches the apex of 3.

Hab. Guatemala, Calderas, on the slope of the Volcan de Fuego.

Gorham described the female only of this species, although he had specimens of both sexes before him. *A. plagiatus* has the facies of a *Malachius*, owing to its long, opaque elytra, which are subparallel in the male. The head is

black to the anterior margin in both sexes, but the sides of the front are testaceous. The discoidal black patch on the prothorax is sometimes so extended as to leave only the hind angles narrowly bordered with testaceous. The upper surface and tibiae are set with very long bristly hairs.

8. *Attalus opacipennis*, n. sp.

♀. Elongate, opaque, the head shining; black, the labrum and mandibles, the base of the palpi, the two basal joints of the antennae externally, the margins of the prothorax posteriorly, the anterior coxae, trochanters, and femora, the intermediate coxae, and the lower edge of the intermediate femora, testaceous; clothed with fine cinereous pubescence intermixed with long, erect, dark, bristly hairs. Head broader than long, minutely punctulate, shallowly bifoveate in front; antennae long, slender. Prothorax a little broader than long, about as wide as the head with the eyes; densely alutaceous and minutely punctate. Elytra long, subparallel, a little wider than the prothorax; densely alutaceous. Legs elongate, slender.

Length nearly 3 mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

One female. Near the Guatemalan *A. plagiatus* (Gorh.), but much smaller, the prothorax densely alutaceous and opaque, the head only shining.

9. *Attalus byssinus.*

Anthocomus byssinus, Er., Entomographien, p. 109; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 115.

Hab. Mexico (*Mus. Berol.*).

Gorham was unable to identify *A. byssinus* amongst the Mexican material he had for examination. He placed it provisionally near *A. plagiatus*, but it has no relationship with that insect, coming near the species here described under the name *A. crux-nigra*. A co-type (♀) of Erichson is now before me. It has the head black, densely punctulate, and broadly excavate in front; the antennae long, comparatively stout, the two basal joints testaceo-maculate; the prothorax rather broadly and abruptly testaceous at the base, for the rest black; the elytra moderately long, subparallel, wider than the prothorax, not nearly covering the abdomen, shining, violaceous (a narrow testaceous

space at the sides below the base excepted), densely punctulate; the femora obscure testaceous at the base; the upper surface closely cinereo-pubescent, the elytra also thickly set with intermixed erect, black, bristly hairs.

10. *Attalus aeneopicipennis.*

Anthocomus aeneopicipennis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 117.

♂. Antennae long, feebly serrate, joints 1–4 testaceous, the others slightly infuscate; anterior tarsi with the prolonged upper portion of joint 2 reaching the apex of 3; legs very elongate.

♀. Antennae much shorter, joints 5–11 black; elytra more widened towards the apex; legs more slender and less elongate.

Hab. Mexico, Jalapa.

There is a pair of this species in the "Biologia" collection. Easily recognisable by its pallid head, prothorax, and under surface and the golden-green elytra, the upper surface shining, the basal portion of the femora to a greater or less extent testaceous and the rest of the legs infuscate or black. The specimen marked "type," a ♂, was in very dirty condition. The antennae differ greatly in length and colour in the two sexes.

11. *Attalus hepburnius.*

Anthocomus hepburnius, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 317.

Hab. Mexico, Chihuahua.

The unique type of this insect is a female, and, as the author states, it is recognisable by the tuberculiform prominence on the epistoma. The head is blackish, the elytra nigro-cyaneous, and the prothorax rufous, with an oblong black streak on the disc in front. The surface is rather dull, the puncturing excessively minute and close. *A. hepburnius* is perhaps related to *A. mexicanus*, but as the male of the former is unknown the species can be left here for the present.

12. *Attalus crux-nigra*, n. sp.

Anthocomus discimacula, var.?, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 116.

♀. Rather elongate, the head and prothorax shining, the elytra duller; black, the basal joints of the antennae externally, the pro-

thorax with the anterior margin (except along the median third) and an angular patch on each side at the base (these markings connected laterally, leaving a large black cruciform patch), and the anterior femora (except along their upper edge), coxae, and trochanters, testaceous, the elytra nigro-caeruleous; finely pubescent and also set with intermixed longer, semi-erect hairs. Head short, broad, minutely punctulate, bi-impressed in front; antennae moderately long, feebly serrate, joints 3–11 much longer than broad. Prothorax convex, small, broader than long, polished, minutely punctulate. Elytra moderately long, much broader than the prothorax, widened posteriorly; rugulose and densely punctate. Legs slender; posterior tibiae curved.

Var.(?) The black markings on the prothorax reduced to a median vitta. ♀.

Length 2½ mm.

Hab. Mexico, Jalapa.

Gorham treated this insect as a variety of his *A. discimacula* (a species here transferred to the genus *Micromimetes*), from the female of which (a broken specimen from Guanajuato) it may be identified by its larger size, the much longer, simple antennae, the sharply-defined cruciform black patch on the prothorax, and the broader and more distinctly punctate elytra. *A. crux-nigra* comes near *A. hepburnius*, differing from that species in its smaller and more polished prothorax, flattened epistoma, etc. The broader head, the more transverse prothorax, the duller, less metallic elytra, etc., separate *A. crux-nigra* from *A. coelestinus*. The description of the present species is taken from a female from Jalapa, and there is another example of the same sex from Cordova (now without a head), also sent by Höge, which probably belongs to *A. crux-nigra*, differing from the other in having the black patch on the prothorax less extended in the middle posteriorly. The var.?, from the Sommer collection, in the Oxford Museum, from "Mexico," may also belong to the same species.

13. *Attalus forticornis*, n. sp. (Plate II, figs. 11, 11*a*, ♂.)

Moderately elongate, widened posteriorly, shining; black, the clypeus, the basal three or four joints of the antennae externally, the two basal joints of the anterior tarsi in ♂, the prothorax, a common transverse median fascia on the elytra (extending some distance up and down the suture, and along the outer margin to

beneath the humeri), the anterior coxae, the trochanters in part, the mesosternum and side-pieces and abdomen rufo-testaceous or testaceous, the rest of the elytra violaceous, the tarsi piceous; sparsely clothed with fine cinereous pubescence intermixed with numerous long erect hairs. Head transverse, minutely punctulate, the front broadly excavate in both sexes; antennae rather stout, very elongate and distinctly serrate in ♂ (reaching to the middle of the elytra when the head is extended), much shorter in ♀. Prothorax convex, a little broader than long, rounded at the apex, very sparsely and minutely punctulate. Elytra oblong, widened posteriorly, broader than the prothorax at the base; closely, minutely punctate. Legs comparatively long and stout.

♂. Anterior tarsi (fig. 11*a*) with the elongate upper portion of joint 2 reaching the apex of 3, rather narrow, and curved inwards towards the tip, joint 3 (seen from the side) longer than 1.

Length 4¼–5 mm. (♂ ♀.)

Hab. Mexico, Hacienda de la Imagen and Acaguizotla in Guerrero, 3,500–4,000 feet (*H. H. Smith*).

Two males and one female of this remarkable Malachiid were captured by Mr. Smith. The very elongate, comparatively stout antennae of the male is suggestive of the Galerucid-genus *Diabrotica*, while the female might be passed over for a *Collops* near *C. 4-maculatus*. The apical joint of the maxillary palpi is slender, and acuminate at the tip.

14. *Attalus maculosus.*

Anthocomus maculosus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 115, t. 7, fig. 1 (♂).

♂. Anterior tarsi with joints 1 and 2 testaceous, the prolonged upper portion of joint 2 stout, reaching the apex of 3; anterior and intermediate femora (except along their upper edge), the base of the posterior femora, and the coxae and trochanters, testaceous.

♀. Legs black.

Hab. Guatemala, San Gerónimo and Chiacam in Vera Paz.

The male of this species has the head and prothorax, a triangular black patch on each side of the latter towards the apex excepted, rufo-testaceous, these portions (the basal edge of the prothorax excepted) being black in the female. The elytra have each a large patch at the base and another towards the apex black. In both sexes the

head is nigro-setose behind the eyes. The colour of the head and prothorax is probably variable, as in some of the allied forms. The sexual characters were in part described by Gorham.

15. *Attalus sexguttatus*, n. sp. (Plate II, fig. 12, ♀.)

♀. Moderately elongate, widened posteriorly, shining, the elytra subopaque; rufo-testaceous, the prothorax with a spot on each side of the disc, and the elytra with a humeral patch and a subtriangular mark on the outer part of the disc beyond the middle, black, the terminal joint of the maxillary palpi, the antennal joints 4–11, the tibiae (except at the base) and tarsi, and the upper edges of the femora, infuscate or black; finely pubescent, and also set with scattered, long, pallid, semi-erect, bristly hairs. Head transverse, closely, very minutely punctate, the eyes prominent; antennae rather slender, comparatively short. Prothorax small, transverse, closely, very minutely punctate. Elytra moderately long, broader than the prothorax, much widened posteriorly, flattened on the disc anteriorly, the humeri tumid; rugulose, and densely, very minutely punctate. Legs long and slender.

Length 3 mm.

Hab. Panama, Tolé (*Champion*).

One example, found in January, 1883. This species approaches one of the forms of the variable of *A. rufipennis* (Gorh.), except that the elytra have an additional subapical spot; the puncturing, however, of the whole of the upper surface is finer and denser, the prothorax is smaller, and the eyes are more prominent. *A. maculosus* has a much larger head and prothorax, etc.

16. *Attalus pusillus.*

Anthocomus pusillus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 116, t. 6, fig. 24.

The two specimens from Cordova referred to this species by Gorham are females. The one treated as a variety (immature) is more shining than the selected type, and has the basal half of the head black, the black markings on the elytra more extended (those at the base forming a common fascia), and the puncturing of the elytral surface sparser. There is no difference in size, both measuring about 2½ mm. in length.

17. *Attalus teapanus*, n. sp.

Moderately elongate, narrow, shining; black, the labrum and clypeus, the anterior margin of the head and a minute spot between the eyes, the bases of the mandibles and palpi, the prothorax (an incomplete median vitta and an indeterminate patch on each side of it anteriorly excepted), and the ventral surface in part, rufo-testaceous, the elytra violaceous, with the outer margin from about the middle and the apex flavo-testaceous; sparsely pubescent without intermixed longer hairs. Head short, minutely punctate, the eyes large; antennae moderately long, rather stout, serrate. Prothorax ample, strongly transverse, convex, minutely punctulate. Elytra subparallel, comparatively short, not covering the long abdomen, very little wider than the prothorax; rugulose, and closely finely punctate.

♂. Anterior tarsi with the prolonged upper portion of joint 2 nearly reaching the apex of 3; elytra compressed and acuminate at the apex.

Length (excl. abdom.) 2 mm. (♂.)

Hab. Mexico, Teapa in Tabasco (*H. H. Smith*).

One male. This species agrees with *A. tabogensis*, Gorh., in having the abdomen extending far beyond the elytra, but differs totally in colour, and in the longer and stouter antennae, etc. The apices of the elytra of the male are formed very much as in the same sex of the two species here referred to *Anthocomus*, but it is possible that this is in part due to shrinkage after death. The last dorsal segment of the abdomen is unimpressed.

18. *Attalus rufipennis.*

Anthocomus basalis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 116 (part.) (*nec* Erichson; *nec* Leconte).
Anthocomus rufipennis, Gorh., loc. cit. t. 6, fig. 25.

♂. Anterior tarsi with joints 1 and 2 testaceous, the prolonged upper portion of 2 stout and reaching the apex of 3.

♀. Posterior tibiae simple.

Hab. Mexico, Vera Cruz and Tabasco; Guatemala, generally distributed, and apparently common in Baja Vera Paz (San Gerónimo).

The insect figured by Gorham under the name *A. rufipennis*, and identified by him as *A. basalis*, Er., in the text, is not the *A. basalis* of Erichson, which has the elytra

plicate and sharply carinate laterally, there being no trace of plica or carina in *A. rufipennis*. His var. *β* (red, with black shoulder-spot) of *A. rufipennis*, three females of which are before me, is from Vera Cruz. The other forms were all obtained at San Gerónimo. The examples quoted by him from Zapote, Mirandilla, and Chontales belong to other species. A co-type (♂) of Erichson's *A. basalis* has been examined by me.*

19. *Attalus nigricornis*, n. sp.

Anthocomus basalis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 116 (part.).

Moderately elongate, widened posteriorly, shining; black, the head with the anterior half in ♂, or wholly in ♀, the prothorax (an oblong streak on the disc excepted in ♂), the basal joints of the antennae externally, the anterior coxae and trochanters, and the anterior femora in part and the abdomen in ♀, rufo-testaceous; the elytra with a common broad basal fascia (extending down the suture to the middle in ♂) violaceous and for the rest testaceous; finely pubescent. Head transverse, broad, minutely punctate; antennae rather short in both sexes. Prothorax transverse, convex, minutely punctate. Elytra rather short, very little wider than the prothorax at the base, widened posteriorly, closely, finely punctate.

♂. Anterior tarsi with the prolonged upper portion of joint 2 nearly reaching the apex of 3.

♀. Posterior tibiae strongly curved.

Length 2–2½ mm. (♂ ♀.)

Hab. British Honduras, Belize (*Blancaneaux:* ♂); Guatemala, Zapote (*Champion:* ♀).

Two specimens, the female much larger than the male, and with the head and prothorax wholly rufo-testaceous. More shining than *A. rufipennis*, the basal fascia of the elytra violaceous (instead of black), the prothorax relatively broader (at least in ♀), the puncturing of the elytra less dense and not so fine. The colour is doubtless equally variable. The metallic base of the elytra and the simply curved posterior tibiae of the female separate *A. nigricornis* from *A. varicus*.

* The N.-American *A. basalis*, Lec., requires a new name: *lecontei* is here substituted for it.

20. *Attalus scabripennis*, n. sp.

Anthocomus, n. sp., Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 318.

♀. Moderately elongate, the head and prothorax shining, the elytra opaque; black, the sides of the head before the eyes, the basal joints of the antennae externally, the base of the prothorax rather broadly, the mesosternum, and trochanters rufo-testaceous; the elytra fusco-violaceous, with a sutural stripe—starting from a little below the base, widened anteriorly, and at the apex dilated into a broad patch,—and the outer limb narrowly, testaceous; finely cinereo-pubescent. Head transverse, closely, very minutely punctulate, the eyes not very prominent; antennae short, joints 7–10 transverse. Prothorax convex, broader than long, much rounded at the sides, closely, very minutely punctulate. Elytra broader than the prothorax, much widened posteriorly, rugulose and densely, very finely punctate. Legs comparatively short and rather stout. Length $2\frac{3}{4}$ mm.

Hab. Guatemala, Tocoy in Baja Vera Paz (*Champion*).

One specimen, found in November, 1879. Recognisable by the opaque, very densely punctate, peculiarly marked elytra, the broadly rufescent base of the prothorax, the short antennae, and the rather stout legs. Gorham compares this insect with *Attalus verberatus*, from Panama, which has somewhat similarly coloured elytra, at least in the form (♂) selected by him as the type.

21. *Attalus verberatus*.

Attalus verberatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 318.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, about reaching the apex of 3.

Hab. Panama, Peña Blanca.

Gorham described the two sexes of this species. The elytra are somewhat variable in colour, the narrow antemedian fascia being reduced to a small lateral patch in the male. The antennae are rather elongate in both sexes.

22. *Attalus albomarginatus*, n. sp.

Rather short, shining; black, the four basal joints of the antennae, the front of the head (the pallid space extending angularly upwards

in the middle behind), the prothorax (a lanciform mark on the disc excepted), the apical portion of the abdomen, the apices of the femora, the tibiae, and the tarsi to near the tip, testaceous or pale testaceous; the elytra fusco-violaceous, with the outer margin, apex, and the suture from a little below the base, whitish; finely pubescent. Head large, broad, densely, minutely punctate, shallowly foveate between the eyes; antennae long, feebly serrate. Prothorax transverse, closely, minutely punctate. Elytra comparatively short, wider than the prothorax; densely, finely, distinctly punctate.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, about reaching the apex of 3.

Length 2 mm. (♂.)

Hab. Mexico (*Truqui, in Mus. Brit.*).

One male. In this minute species the elytra are fusco-violaceous, with the suture (to near the base), outer margin, and apex whitish, the dorsal stripe being slightly sinuate externally; the femora are black, with the apices abruptly testaceous and coloured like the tibiae; and the antennae are rather elongate. The elytra are somewhat distorted in drying, but the sculpture and markings are clearly visible.

23. *Attalus albolimbatus*, n. n.

Attalus limbatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 119 (*nec* Fabricius).

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, nearly reaching the apex of 3.

Hab. Guatemala.

The type of this species is a female; the fragmentary remains of the second specimen mentioned by Gorham include the anterior tarsi, sufficient to indicate the male sex. *A. albolimbatus* is a small, narrow form, with the anterior half of the head, the margins of the prothorax completely, and the sutural, outer, and apical margins of the elytra, whitish or pale testaceous, the rest of the head and prothorax being black and that of the elytra aeneo-piceous; the body beneath and the legs (the tarsi and apices of the tibiae excepted) are testaceous; and the elytra and the tip of the abdomen are strongly nigro-setose. The last-mentioned character separates the present species from the northern *A. cinctus*, Lec. The specific name *limbatus* is preoccupied and a new one is therefore required.

24. *Attalus cinctus.*

Anthocomus cinctus, Lec., Proc. Ac. Phil. 1852, p. 166.
Attalus cinctus, Horn, Trans. Am. Ent. Soc. iv, p. 126, and Proc. Calif. Acad. Sci. (2) iv, p. 329; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 318.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, reaching the apex of 3.

Hab. Southern United States; Lower California; N. Mexico, Sonora.

This small species has the basal margin of the prothorax, and the sutural, apical, and lateral margins of the elytra (the sutural margin more broadly so towards the middle), flavo-testaceous, the front of the head in the male similarly coloured in the middle and at the sides, and the rest of the upper surface black. The head is very broad in the male, a little narrower in the female. The pubescence is fine.

25. *Attalus viridivittatus*, n. sp. (Plate II, fig. 13, ♂.)

Moderately elongate, shining; black, the front of the head (the pallid coloration extending triangularly upwards in the middle to between the eyes), the basal joints of the antennae, the prothorax (an elongate triangular patch on the anterior portion of the disc excepted), and legs (the base of the anterior femora excepted) rufo-testaceous; the elytra each with a very broad, mesially constricted, green stripe extending down the disc to near the apex, these markings coalescent at the base, the suture, outer margins and apex rufo-testaceous; sparsely pubescent, and also set with intermixed long semi-erect hairs. Head short, broad, closely, minutely punctate, foveate between the eyes, and feebly bi-impressed in front; antennae long, serrate, joints 4–10 longer than broad, 11 elongate. Prothorax ample, broader than long, closely, minutely punctate. Elytra broader than the prothorax, widened posteriorly; rugulose, closely, finely punctate.

♂. Anterior tarsi with the prolonged upper portion of joint 2 about reaching the apex of 3.

Length $1\frac{9}{16}$ mm. (♂.)

Hab. Mexico, Chilpancingo in Guerrero, 4,600 ft. (*H. H. Smith*).

One male only of this handsome little insect was captured. It approaches *A. cinctus*, Lec., and bears a considerable

resemblance to the Palaearctic *Colotes trinotatus*, Er. The N.-American *A. rufiventris*, Horn, again, is not unlike the present species, except that it is very much larger.

26. *Attalus tabogensis*.

Attalus tabogensis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 319.

♂. Anterior tarsi with the prolonged upper portion of joint 2 about reaching the apex of 3; last dorsal segment of the abdomen with a very deep fovea extending down the apical half.

♀. Last dorsal segment arcuate-emarginate in the middle at the tip.

Hab. Panama, Taboga Island.

This species is allied to *A. albolimbatus* (= *limbatus*, Gorh.), differing from it in the shorter, opaque elytra (leaving two or three segments of the abdomen exposed), the non-metallic dorsal vitta of the latter, and the peculiar ♂-characters. The elytra and the exposed dorsal surface of the abdomen are conspicuously nigro-setose. The colour of the head and prothorax is variable. The antennae are short in both sexes. A female from the same locality, evidently belonging to *A. tabogensis*, has the prothoracic margins only pale, and the elytra more elongate, with the dorsal stripe (which is narrowed or evanescent anteriorly in the types) broad throughout, and extending inward to the suture at the base.

27. *Attalus scutellaris*.

Attalus scutellaris, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 119.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, reaching the apex of 3.

Hab. Mexico; Guatemala.

Represented in the "Biologia" collection by a pair from Guatemala and a female from Mexico. Very like *A. anthobioides*, but with a large, aeneo-piceous, elongate-triangular, common scutellar patch reaching to beyond the middle of the elytra; the prothorax less transverse, and with the dark portion brassy (the anterior margin testaceous in ♂); the elytra more shining, and densely, minutely punctate. *A. scutellaris* is related to the N.-American *A. scincetus*, Lec.

28. *Attalus anthobioides.*

Attalus anthobioides, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 119.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, reaching the apex of 3; antennal joints 4–10 about as broad as long.

Hab. Guatemala.

A small form, with the front of the head broadly, the antennae, the margins of the prothorax, the elytra, and legs testaceous; the head and prothorax transverse, shining; the elytra dull, feebly punctate; the upper surface set with bristly, dark, scattered hairs; the antennae short. Four females and two males seen.

29. *Attalus subfasciatus.*

Attalus subfasciatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 320, t. 13. fig. 2 (*nec* Fall, 1897 *).

Hab. Mexico, Northern Sonora.

The five specimens seen of this species are all of the female sex. A small, rather convex, very shining form; nigro-piceous in colour, with the basal margin of the prothorax, and a common, interrupted, outwardly-dilated, ante-median fascia on the elytra, testaceous; the femora and posterior tibiae more or less infuscate and the rest of the legs testaceous; the pubescence (? abraded) only just traceable.

30. *Attalus megalops*, n. sp.

Moderately elongate, narrow, shining; black, the mouth-parts, the reflexed basal and outer margins of the prothorax, a large triangular patch on the outer half of the elytra before the middle, and the apex of the latter, the under surface of the head and prothorax, the abdomen in part, and the trochanters and legs, testaceous, the antennae infuscate, with joints 1–5 more or less testaceous; sparsely, finely pubescent, with intermixed longer hairs. Head short, including the very large eyes broader than the prothorax, sparsely, minutely punctulate; antennae slender, moderately long. Prothorax large, transverse, convex, minutely punctulate. Elytra rather elongate, scarcely broader than the

* The name *falli* is here substituted for the Californian *A. subfasciatus*, Fall (Canad. Entom. xxix, p. 243).

prothorax at the base, widened towards the apex; closely, very finely punctate.

♂. Anterior tarsi with the prolonged upper portion of joint 2 rather stout, reaching the apex of 3.

Length $2\frac{1}{5}$ mm. (♂.)

Hab. Panama, San Lorenzo (*Champion*).

One male (somewhat immature), captured in January, 1883. Recognisable by its very broad, short head, large, prominent eyes, ample prothorax, interruptedly flavo-fasciate elytra (the triangular lateral patch extending inwards to near the suture), and shining surface. *A. megalops* has the elytra marked much as in *A. subfasciatus*, Gorh., from Sonora, differing from that insect in its less convex form, broad head and prothorax, more elongate elytra, longer limbs, etc.

31. *Attalus debilicornis*, n. sp.

Comparatively short, widened posteriorly, shining, the elytra somewhat opalescent; nigro-piceous, the mouth-parts, antennae, front of the head (the pallid coloration limited behind by the anteriorly bidentate dark portion), the basal margin of the prothorax, a common, post-basal, transverse fascia on the elytra (extending forwards at the sides to beneath the humeri), the apices of the latter, and the trochanters and legs, pale testaceous; sparsely pubescent, and also set with a few dark bristly hairs. Head short, broad, polished, very minutely punctulate, shallowly bifoveate; antennae short, slender, joints 4–10 about as broad as long. Prothorax strongly transverse, minutely punctulate. Elytra very little wider than the prothorax at the base, much widened posteriorly, minutely punctate.

♂. Anterior tarsi with the prolonged upper portion of joint 2 stout, nearly reaching the apex of 3.

Length $1\frac{1}{2}$ mm. (♂.)

Hab. Guatemala, Capetillo (*Champion*).

One male. Closely related to *A. anthobioides*, Gorh., differing from it in the bifasciate elytra, and the shorter, more feebly developed antennae.

32. *Attalus sapphirinus*.

Anthocomus sapphirinus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 117.

Hab. Mexico.

The six examples seen of this species are all females. It may be known by its shining head and prothorax, and rather dull, opalescent, obsoletely punctate, purplish elytra. The head has at least the anterior half testaceous, the black portion being sometimes reduced to a transverse space on the vertex; the prothorax is small and transverse, in some specimens almost wholly black, in others red; the elytra are much widened posteriorly; the pubescence is sparse, and the elytra, as usual, are set with longer, intermixed, semierect hairs; the posterior tibiae (♀) are strongly curved, and the posterior femora are infuscate.

33. *Attalus glaucus*, n. sp.

♀. Moderately elongate, rather narrow, shining, the elytra subopaque; testaceous, the prothorax with a broad median vitta (nearly reaching the base), and the under surface in part (that of the prothorax excepted), black; the elytra with the outer limb to beyond the middle, and the apices narrowly, flavo-testaceous, for the rest dark purplish-brown, appearing opalescent or glaucous in certain lights; the middle and hind tarsi and the apices of the antennae more or less infuscate; finely pubescent, with intermixed longer, semierect hairs. Head broad, short, closely, minutely punctulate; antennae short. Prothorax very convex, ample, transverse, closely, minutely punctulate. Elytra moderately long a little widened posteriorly, very little broader than the prothorax at the base, densely, minutely punctulate. Legs long and rather slender.

Length $2\frac{1}{16}$ mm.

Hab. GUATEMALA, Yzabal (*Sallé*).

One female. Near *A. opalinus*, Gorh., from Chiriqui, differing from that insect in its broader head, more ample, nigro-vittate prothorax, and duller elytra, the apices of which are yellow. The present species is not unlike the European *A. amictus*, Er.

34. *Attalus opalinus.*

Anthocomus opalinus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 317.

Hab. PANAMA, Volcan de Chiriqui.

The type of this species also is a female. It is very like the Mexican *A. sapphirinus*, but is readily separable by the more elongate elytra; the sides of the latter, and the base

of the prothorax, are sharply margined with pale testaceous; and the legs are more elongate, the posterior tibiae much straighter.

35. *Attalus laeviusculus*, n. sp.

♂. Rather short, shining; black, the basal five joints of the antennae, the bases of the tibiae and tarsi, and the anterior femora, more or less testaceous; finely, sparsely pubescent. Head short, broad, very sparsely, obsoletely punctate; antennae rather short, distinctly serrate, joints 6–10 about as broad as long. Prothorax convex, transverse, obsoletely punctate. Elytra a little wider than the prothorax at the base, dilated posteriorly, somewhat rugulose and obsoletely punctate. Anterior tarsi with the prolonged upper portion of joint 2 about reaching the apex of 3. Posterior tibiae bowed.

Length 2 mm.

Hab. Mexico, Atoyac in Vera Cruz (*H. H. Smith*).

One male. Distinguishable amongst its allies by the shining, comparatively smooth, black upper surface, convex prothorax and partly dark legs. The antennae (♂) are much shorter than in the same sex of *A. nigroaeneus*, *A. nigritulus*, etc.

36. *Attalus sulcifrons*, n. sp.

♀. Narrow, moderately elongate, inflated posteriorly, very shining; black, with a faint brassy lustre, the labrum, and the basal joints of the antennae in part, obscure ferruginous, the legs wholly piceous; finely pubescent, with intermixed long, suberect hairs. Head short, broad, obsoletely punctulate, canaliculate on the vertex and feebly bifoveate in front, the eyes very prominent; antennae short, joints 6–10 transverse. Prothorax transverse, not very convex, feebly rounded at the sides, polished, obsoletely punctulate. Elytra wider than the prothorax, moderately long, rugulose, sparsely punctulate. Legs very slender; posterior femora strongly bowed.

Length $2\frac{1}{3}$ mm.

Hab. Mexico, Cordova (*Höge*).

One specimen. Extremely like *A. nigritulus*, Gorh. (♀), with which it was first confused by me, but separable from that species by the much shorter head (as seen detached from the prothorax), the canaliculate vertex, the shorter antennae, joints 6–10 of which are transverse,

the shorter prothorax, and the smoother elytra. The uniformly dark legs, the differently formed antennae, the sulcate vertex, the longer, subaeneous elytra, and the less convex prothorax distinguish *A. sulcifrons* from *A. laeviusculus*; and the dark legs, smoother surface, etc., from *A. nigroaeneus*, Gorh.

37. *Attalus atratus*, n. sp.

♀. Narrow, moderately elongate, slightly widened posteriorly, shining; black with a faint brassy lustre, the basal joints of the antennae obscure testaceous externally, the legs piceous; finely pubescent, with a few intermixed longer hairs. Head short, obsoletely punctulate, feebly bifoveate in front, the eyes (as seen from above) rather small and not prominent, the post-ocular space very short; antennae rather short, joints 4–10 slightly longer than broad. Prothorax transverse, convex, rounded at the sides, faintly punctulate. Elytra a little wider than the prothorax, moderately long, closely, distinctly punctate. Posterior tibiae feebly curved.

Length $2\frac{1}{8}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

Two females. This insect agrees with *A. sulcifrons* (♀) in colour, and in having a short head; but the eyes are less prominent, the prothorax is more convex, the elytra are less inflated posteriorly and closely, distinctly punctate, and the posterior tibiae are much straighter. The short head, smaller eyes, straighter hind tibiae, etc., distinguish *A. atratus* from *A. nigritulus* (♀).

38. *Attalus caraboides*.

Attalus caraboides, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 120.

♂. Anterior tarsi with the prolonged upper portion of joint 2 about reaching the apex of 3; anterior and intermediate trochanters each produced into a sharp tooth, the tooth on the intermediate pair long and curved, that of the posterior pair drawn out into a long spoon-shaped process.

Hab. Guatemala, Panajachel, on the Lake of Atitlan.

The five specimens seen are all males. A shining aeneous form, with the legs (the posterior femora and the apical joint of each tarsus excepted), the mouth-parts, and the antennae in great part or entirely, testaceous.

39. *Attalus nigroaeneus.*

Anthocomus nigroaeneus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 117.

♂. Antennae elongate, feebly serrate, joints 3–11 longer than broad; anterior tarsi with the prolonged upper portion of joint 2 slender, about reaching the apex of 3.

♀. Antennae much shorter, joints 4–10 about as broad as long; posterior tibiae slightly produced at the inner apical angle.

Hab. Guatemala.

A small, shining, nigro-aeneous form, thickly clothed with long erect hairs intermixed with the fine pubescence; the legs variable in colour, but with at least the posterior femora infuscate; the elytra much widened posteriorly in both sexes. The single male included in the series of five examples before me has the antennae very much more elongate than in the females.

40. *Attalus laevifrons*, n. sp.

♀. Comparatively short, much widened posteriorly, shining; nigro-aeneous, the elytra with a greenish lustre, the antennae fusco-testaceous, the clypeus, the points of insertion of the antennae, the legs (the tips of the tarsi excepted), and trochanters testaceous; finely pubescent and also set with long, erect, intermixed, bristly hairs. Head polished, sparsely, excessively minutely punctate, obsoletely foveate on the vertex, unimpressed in front; antennae very short, joints 8–10 subtransverse. Prothorax small, transverse, sparsely, excessively minutely punctate. Elytra comparatively short, broader than the prothorax, much widened posteriorly; closely, finely punctate. Legs slender; posterior tibiae slightly produced at the inner apical angle.

Length 2 mm.

Hab. Panama, Peña Blanca (*Champion*).

One female, found in January, 1883. Less elongate and more shining than *A. nigroaeneus*, the head smoother, the antennae (♀) very short, with the penultimate joints subtransverse, the elytra shorter, greenish, and closely, finely punctate, the legs testaceous.

41. *Attalus laticollis.*

Anthocomus laticollis, Er., Entomographien, p. 112; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 117.

Hab. Mexico (*Mus. Berol.*), "Temisco" [? in Puebla] (*Mus. Oxon.*).

In the Hope Museum at Oxford there is an *Attalus* apparently belonging to this species. It is a minute greenish insect, clothed with fine whitish pubescence, the elytra densely, minutely punctate, the prothorax as broad at the base as the elytra, the legs and antennae (the extreme base of the latter excepted) infuscate, and agrees thus far with Erichson's description.

42. *Attalus plumbeus*, n. sp.

♀. Elongate, depressed, much widened posteriorly, opaque; nigro-plumbeous, the sides of the head before the eyes, the anterior coxae, the posterior trochanters, and the abdomen with the sides, the basal segments down the middle, and the membranous portions, flavo-testaceous; the entire upper surface excessively finely scabroso-punctate, very finely cinereo-pubescent, the post-ocular portions of the head and the terminal abdominal segments also set with bristly hairs, the elytra with intermixed scattered longer hairs. Head rather small, narrower than the prothorax, the eyes large; antennae feebly serrate, moderately long, joints 3–11 much longer than broad. Prothorax large, very little broader than long, strongly rounded at the sides. Elytra broader than the prothorax, rapidly widened to the broadly rounded apices, not nearly covering the abdomen. Legs elongate, slender.

Length (excl. abdom.) 3¼ mm.

Hab. Mexico, Sayula in Jalisco (*Höge*).

One female. Amongst the Mexican forms this species is not unlike *A. opacipennis*, from which it may be recognised by its very opaque, uniformly plumbeous, sericeo-pubescent upper surface, and the posteriorly dilated elytra. The surface-sculpture is extremely fine. The last four abdominal segments are exposed, owing to the gravid condition of the insect, showing that very little reliance can be placed on this character. The following is a nearly allied form.

43. *Attalus olivaceus*, n. sp.

♀. Elongate, subparallel, opaque; greenish-olivaceous, the sides of the head before the eyes, and the basal joints of the antennae externally, testaceous, the tibiae and tarsi in part fusco-testaceous; the entire upper surface excessively finely scabroso-punctate, and clothed with fine, sericeous, ashy pubescence, the post-ocular portions

of the head set with bristly hairs. Head short, broad, about as wide as the prothorax, transversely depressed in front, the eyes rather large; antennae comparatively short, feebly serrate, joints 3–11 longer than broad. Prothorax transverse, rather convex, rounded at the sides, very little narrower at the apex than at the base. Elytra long, subparallel, slightly wider than the prothorax at the base. Legs elongate, slender.

Length 3½ mm.

Hab. Mexico (*ex coll. Sommer, in Mus. Oxon.*).

One female. More elongate than *A. plumbeus*, greenish-olivaceous in colour, the head about as wide as the prothorax and transversely excavate in front, the antennae shorter, the prothorax more convex, the elytra longer and subparallel. *A. olivaceus* is very like a *Dasytes*, and it might be mistaken for a species of that genus. The male, unfortunately, of both *A. plumbeus* and *A. olivaceus*, is unknown; but the insects unquestionably belong to the Malachiides, and they are probably correctly placed in *Attalus*.

44. *Attalus plicatus*, n. sp.

Moderately elongate, widened posteriorly, shining; rufo-testaceous, the elytra with a common basal fascia (excised along the suture behind) and a transverse subapical patch on the disc, a broad space across the metasternum beneath, the legs, the apical joint of the maxillary palpi, and joints 5–11 of the antennae, black, joints 1–4 of the latter obscure testaceous; finely pubescent, without intermixed longer hairs. Head broad, transverse, minutely punctate, obsoletely bifoveate in front; antennae long, stout, moderately serrate, joints 3–11 longer than broad. Prothorax ample, transverse, convex, very shining, sparsely, excessively minutely punctate. Elytra moderately long, at the base scarcely wider than the prothorax, much widened posteriorly, somewhat opalescent, transversely depressed below the base and distinctly plicate laterally from the humeral callus to about the middle; densely, conspicuously punctate.

♂. Anterior tarsi with the prolonged pallid upper portion of joint 2 reaching the apex of 3.

Length 3 mm. (♂.)

Hab. Mexico, Chilpancingo in Guerrero, 4,600 feet (*H. H. Smith*).

One male. Near *A. rufipennis*, differing from all the forms of that species in the laterally plicate, more coarsely

punctate, subapically maculate elytra, the larger and smoother prothorax, and the longer antennae. The duller, densely punctate, non-carinate, subapically maculate elytra separate *A. plicatus* from *A. basalis*, Er., and *A. carinatus*, Gorh. It is very probable that the present species varies in the colour of the head and prothorax. The apical joint of the maxillary palpi is rather stout, and obliquely truncate at the tip.

45. *Attalus carinatus.*

Attalus carinatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 320, t. 13, fig. 4.

♂. Anterior tarsi with the prolonged upper portion of joint 2 nearly reaching the apex of 3.

Hab. Panama, Chiriqui.

Extremely like the Colombian *A. basalis*, Er. (a co-type, ♂, of which has been communicated by Prof. H. J. Kolbe for comparison), but larger, the head and prothorax broader, smoother, and entirely rufous; the elytra with a similar very prominent submarginal carina, and a large black patch at the base, the puncturing a little coarser and closer; the maxillary palpi stouter. From similarly coloured *A. rufipennis* the present species may be known by its more shining surface, carinate, more strongly punctured elytra, and stouter palpi. The legs and antennae vary in colour. Ten specimens seen.

46. *Attalus viridimicans*, n. sp.

♀. Elongate, rather convex, much widened posteriorly; brilliant golden-green, the mouth-parts, palpi, anterior portion of the head, antennae (the infuscate six outer joints excepted), trochanters, and legs (the basal half of the posterior femora excepted), flavo-testaceous; sparsely, finely pubescent, without intermixed longer hairs. Head very short, broad, faintly punctulate, the clypeus very broad, longer than the labrum; antennae slender, joints 3–10 longer than broad, 11 elongate. Prothorax short, convex, strongly rounded at the sides, hollowed laterally at the base, faintly punctulate. Elytra of the same width as the prothorax at the base, at the apex nearly one-half broader, somewhat rugulose, and finely, distinctly punctate. Legs long, moderately slender, the posterior tibiae feebly curved.

Length 3¼ mm.

Hab. Mexico, Soledad in Guerrero, 5,500 feet (*H. H. Smith*).

One example. A comparatively large, rather convex, brilliant golden-green form, with the legs (the base of the posterior femora excepted), the basal joints of the antennae, and the front of the head pale testaceous. The pubescence is fine and sparse, and there are no long intermixed erect hairs such as are present in *A. aeneovirens* (Gorh.). The epistoma is broad and very short; the clypeus is strongly developed (longer than the labrum); and the maxillary palpi are stout, with the apical joint oblong-ovate and subacuminate.

47. *Attalus chalceus*, n. sp.

♀. Narrow, moderately elongate, rather convex, subopaque; aeneous, the antennae (the infuscate apical joints excepted), bases of the palpi, anterior trochanters, tibiae, and tarsi testaceous, the femora piceous; finely cinereo-pubescent. Head short, narrower (with the eyes) than the prothorax, densely, very minutely punctate; antennae short, joints 8–10 subtransverse. Prothorax strongly transverse, as wide as the base of the elytra; densely, excessively minutely punctate, somewhat shining on the middle of the disc. Elytra rather long, widened posteriorly, dull, alutaceous, and with scattered minute punctures. Legs slender.

Length $2\frac{1}{2}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

One specimen. A rather convex, narrow, brassy, subopaque form, with testaceous antennae (the apices excepted), tibiae, and tarsi. The type is abraded, but a short fine cinereous pubescence is still present along the sides of the prothorax and elytra. The clypeus is extremely short, not so long as the labrum. The maxillary palpi are stout, acuminate at the tip.

48. *Attalus aeneovirens*.

Ebaeus aeneovirens, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 121.

♂. Anterior tarsi with the prolonged upper portion of joint 2 about reaching the apex of 3.

Hab. Guatemala, Calderas on the slope of the Volcan de Fuego.

A short, convex, shining, brassy-green form, with the

elytra inflated posteriorly in both sexes and coarsely punctate; the legs testaceous, with the femora to near the apex, and the apices of the tibiae and tarsi, infuscate; the palpi stout; the surface set with long, fine, erect hairs, intermixed on the prothorax with short cinereous pubescence. In general shape *A. aeneovirens* is not unlike the European *A. cyaneus*, Ros. Gorham stated that he was unable to distinguish the sexes.

49. *Attalus flavomarginatus*, n. sp. (Plate II, fig. 14, ♀.)

Short, much widened posteriorly in both sexes, shining; aeneous, the labrum and mouth-parts, the antennae in great part or entirely, the head in ♂ from the anterior margin to between the eyes, and in ♀ at most with the anterior margin, the prothorax on all sides (leaving a large dark transverse discoidal patch), and the legs, flavous or testaceous; sparsely clothed with fine pallid pubescence, the hairs on the elytra long, uniform. Head very short, broad, sparsely punctulate, the clypeus as long as the labrum; antennae rather long in both sexes, slender, joints 3–11 longer than broad. Prothorax very broad, short; closely, minutely punctulate. Elytra short, wider than the prothorax, dilated, convex, and abruptly declivous posteriorly; closely, coarsely punctate. Legs slender.

♂. Anterior tarsi with the prolonged upper portion of joint 2 nearly reaching the apex of 3.

Length $2\frac{1}{6}$–$2\frac{2}{3}$ mm. (♂ ♀.)

Hab. Mexico, Chilpancingo and Omilteme in Guerrero, 4,600–8,000 feet (*H. H. Smith*).

Ten specimens, four of which are males. Near *A.* (*Ebaeus*) *aeneovirens*, Gorh., from the slope of the Guatemalan Volcan de Fuego; differing from it in the relatively broader, less convex, and sharply flavo-marginate prothorax, the more extended yellow portion of the head in the male (appearing as three large coalescent patches), the entirely pale legs, and the more uniform vestiture, *A. aeneovirens* having very long conspicuous bristly hairs intermixed with the short cinereous pubescence on the prothorax. The palpi are stout.

50. *Attalus varicus*, n. sp.

Anthocomus basalis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 116 (part.).

Moderately elongate, widened posteriorly, shining; varying in colour from black, with the elytra (a transverse patch at the base of each elytron excepted), the outer edge of the two basal joints of the antennae, and the legs and abdomen in great part testaceous to testaceous, with a humeral spot, the posterior legs in part, the antennae (except at the base), and the tips of the palpi black; finely, sparsely pubescent and also somewhat thickly set with long, suberect, pallid hairs. Head broad, transverse, closely, minutely punctate; antennae rather short in both sexes. Prothorax transverse, convex, minutely punctate. Elytra widened posteriorly, a little broader than the prothorax at the base, rather sparsely, minutely punctate. Legs slender; posterior tibiae curved in both sexes.

♂. Anterior tarsi apparently 4-jointed, the prolonged upper portion of the fused joints 1 and 2 about reaching the apex of 3; posterior tibiae slightly produced at the apex.

♀. Posterior tibiae produced at the apex into a long dentiform process, which reaches as far as the apex of the first tarsal joint.

Length 2–2½ mm. (♂ ♀.)

Hab. Guatemala, Mirandilla (*Champion*: ♀); Nicaragua, Chontales (*Janson*: ♂ ♀); Panama, Taboga Island (*Champion*: ♀).

Three females and one male. The pair from Chontales are taken as the types, the male differing from the female in having the head testaceous to near the base. The Guatemalan example (♀) has the sides of the prothorax broadly and a large humeral patch nigro-piceous; the Taboga specimen (♀) is testaceous, with a black humeral spot. *Anthocomus fuscescens* (= *calcaratus*) (Gorh.), has similar posterior tibiae in the female, but the male of that insect has simple 5-jointed anterior tarsi. In the unique male of the present species the basal joint of the anterior tarsi cannot be distinguished for certain, it being either extremely short or fused with the second.

51. *Attalus coelestinus.*

Attalus coelestinus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 320.

♂. Anterior tarsi with joints 1–3 somewhat thickened, 1 short, 3 as long as 2, 4 small, 2 rounded at the apex as seen in profile; antennae moderately long, serrate.

♀. Antennae shorter and more slender.

Hab. Mexico, Northern Sonora.

Described by Gorham from a single pair, one male and two females having subsequently been detected amongst Morrison's captures. This insect has the head and prothorax black, the latter with a rufo-testaceous patch on each side at the base, this colour in one example extending to the whole of the prothorax; the elytra shining, blue or bluish-green; the basal joints of the antennae externally, the anterior and middle trochanters, and the base of the anterior femora beneath in ♂, testaceous; the pubescence fine, and intermixed with long, semierect, bristly, dark hairs; the anterior tarsi in ♂ (said to be 4-jointed when viewed from above) distinctly 5-jointed, the three basal joints stouter than in the female, the second not lobed above. The last-mentioned tarsal character distinguishes *A. coelestinus* from all its allies, except *A. mexicanus*, and brings these two forms near *Tanaops*, Lec. In one of the two males seen the elytra appear to be compressed and subacuminate at the apex, but this is probably due to shrinkage after death, the specimen being immature.

52. *Attalus mexicanus.*

Attalus mexicanus, Pic, L'Echange, xxvi, p. 5 (Jan. 1910).

Moderately elongate, widened posteriorly, shining, the elytra duller; black, the basal joints of the antennae externally, the prothorax at the sides and base or entirely, and the anterior and intermediate legs in great part in both sexes testaceous, the elytra nigro-violaceous or greenish, sometimes with the disc indeterminately testaceous towards the apex, the posterior tibiae and tarsi piceous; finely cinereo-pubescent, and also set with scattered semierect bristly hairs. Head transverse, broad in ♂, narrower in ♀, closely, minutely punctulate, the front transversely depressed, the epistoma flattened; antennae moderately long, more distinctly serrate in ♂ than in ♀. Prothorax transverse, minutely punctulate. Elytra moderately long, more widened posteriorly in ♂ than in ♀, separately rounded at the apex, densely, minutely punctate. Legs elongate, rather slender; the basal joint of the anterior tarsi rather long in both sexes.

♂. Anterior tarsi with joints 1 and 2 oblique, a little shorter than those following, as seen in profile, 2 much shorter than 1 and not lobed above, 3 and 4 smaller and subequal.

Length $2\frac{4}{5}$–$3\frac{1}{2}$ mm. (♂ ♀.)

Hab. Mexico (*coll. Pic*; *Truqui*, *in Mus. Brit.*), "Temisco" [? Temascala in Puebla] (*Mus. Oxon.*).

The above diagnosis was drawn up, and the same specific name selected, before Pic's description of *A. mexicanus* had been seen by me. There can be little doubt, however, that his insect belongs to the same species, the type of *A. mexicanus* having the prothorax wholly rufo-testaceous, as in one of the females in the British Museum. The six examples examined (4 ♂, 2 ♀) vary in the development of the black discoidal patch on the prothorax, which in the female is small or entirely wanting, and the intermixed semierect hairs on the upper surface are often abraded. The male anterior tarsi are almost simple, the oblique basal joints being very slightly modified. *A. coelestinus*, Gorh., has similar anterior feet in the male, except that the third joint is larger and the first shorter. *A. mexicanus* would be almost as well placed in *Anthocomus*; the latter, however, has the front tarsi similarly formed in the two sexes.

Micromimetes.

Micromimetes, Wollaston, Journ. Ent. i, p. 439 (1862).

Anthocomus discimacula, Gorh., from Mexico, has the anterior tarsi and maxillary palpi formed in the male sex exactly as in *Micromimetes*, Woll., based on two small species from the Canary Is., and it can quite well be included in that genus. The simple 4-jointed front feet of the male also brings it near *Colotes*, Er., under which Wollaston's genus is sunk by Abeille de Perrin; but the apical joint of the maxillary palpi is oblong-ovate and narrowed towards the tip, as in both sexes of *Attalus*.

1. *Micromimetes discimacula*. (Plate II, figs. 15, 15*a*, antenna, 15*b*, front tarsus, ♂.)

Anthocomus discimacula, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 116 (excl. var.).

♂. Antennae testaceous, maculated with black (joints 1, 6, and 8 conspicuously black above), very feebly serrate, joints 2 and 3 subequal, 4 and 5 shorter, 6 and 8 a little stouter than 7, 9 and 10 elongate, widened outwards, 11 oblong-ovate, much longer than 10; anterior legs (the base of the tibiae excepted), intermediate trochanters, and intermediate femora to near the tip, testaceous.

♀. Antennae (joints 2–7 excepted) and legs in great part black;

the antennae more slender, joints 3–8 subequal in length (9–11 missing), 6 distinctly broader than 5 or 7, elytra more widened towards the apex.

Hab. Mexico, Guanajuato.

The male of this insect, described by the author, loc. cit. p. 117, was labelled by him as the type, the diagnosis apparently having been taken from the female. The former is readily recognisable by its simple 4-jointed anterior tarsi, and the peculiarly formed, maculate antennae. The only female reserved for the "Biologia" collection unfortunately wants the anterior legs and part of the antennae. The var. ?, as Gorham supposed, belongs to a different species, *Attalus crux-nigra*. The antennal joints 1–8 of the male of *M. discimacula* might almost be described as moniliform, if viewed in a certain light.

Pseudattalus, n. gen.

Antennae 9-jointed (fig. 16*a*); apical joint of the maxillary palpi narrow, oblong-ovate, subacuminate; elytra short, convex, much widened posteriorly in both sexes, without appendages in ♂; tarsi 5-jointed, the upper portion of the second joint of the anterior pair produced over the third in ♂; the other characters as in *Attalus*.

Type, *Anthocomus minimus*, Er.

Pseudattalus includes *Anthocomus minimus*, Er., and *A. seminulum*, Er. (both of which were placed under *Ebaeus* by Gorham), and *Ebaeus punctatus*, Gorh., minute forms approaching *Ebaeus* and *Hypebaeus*; *E. aeneovirens*, Gorh., has 11-jointed antennae, and it is here included under *Attalus*. *A. minimus* is selected as the type of the present genus, as both sexes of it are contained in the material under examination, the other species being represented by females only. The 9-jointed antennae is a unique character in the group, while the tarsal structure of the male is similar to that of *Attalus*. The species are nigro-violaceous, cyaneous, or black, shining, and sparsely pubescent. In the females the elytra do not nearly cover the abdomen. A peculiar sexual character is to be found in the armature of the intermediate tibiae of the male of *P. minimus*, and in that of the posterior tibiae of the female of *P. armatus*. Prof. H. J. Kolbe has kindly communicated a co-type of Erichson's species for examination.

1. *Pseudattalus minimus.* (Plate II, figs. 16, 16*a*, *b*, ♂.)

Anthocomus minimus, Er., Entomographien, p. 113.
Ebaeus minimus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 121 (part.).

Very shining, nigro-violaceous, the mouth-parts, antennae, and legs testaceous, the apices of the antennae and the bases of the femora sometimes more or less infuscate; the entire upper surface sparsely, minutely punctulate, sparsely pubescent. Head broad, short, the eyes large and prominent, a little smaller in ♀; antennae long and with joints 4–9 elongate in ♂, shorter in ♀. Prothorax transverse, convex, about as wide as the head with the eyes. Elytra short, inflated posteriorly, subalutaceous. Legs slender; intermediate and posterior tibiae with two or more minute short pallid setae at the apex, the posterior pair bowed in both sexes.

♂. Anterior tarsi with the prolonged upper portion of joint 2 extending over the base of 3; intermediate tibiae (fig. 16*b*), with a matted, spiniform, tuft of long blackish setae at the inner apical angle reaching about as far as the apex of the first tarsal joint.

Length 1⅓–1½ mm. (♂ ♀.)

Hab. Panama, Volcan de Chiriqui, Tolé (*Champion*); Colombia.

A co-type (♂) of *A. minimus* is before me, but I am unable to examine its intermediate tibiae, owing to the way the insect is mounted. Five males and three females from Chiriqui are contained in the "Biologia" collection, and the description is therefore taken from them. There can be no doubt, however, that these examples belong to the same species.

2. *Pseudattalus armatus*, n. sp. (Plate II, fig. 17, ♀, posterior tibia.)

Ebaeus seminulum, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 121 (*nec* Erichson).
Ebaeus minimus, Gorh., loc. cit. (part.).

♀. Shining, black, the elytra sometimes with a faint bluish lustre, the antennae and legs testaceous, the outer joints of the former, the femora to near the tip, and the posterior tibiae in part, infuscate; sparsely cinereo-pubescent. Head short, broad, sparsely, obsoletely punctate, bi-impressed in front, the eyes moderately prominent; antennae short. Prothorax convex, transverse, very sparsely, obsoletely punctate. Elytra short, inflated posteriorly, subalutaceous, somewhat closely punctulate. Legs slender;

posterior tibiae (fig. 17) strongly bowed, produced at the apex into a long slender spine which about reaches the apex of the first tarsal joint.

Length 1½–1⅔ mm.

Hab. Guatemala, near the city, Pantaleon, Paso Antonio, San Gerónimo (*Champion*).

Ten specimens, all of the female sex. Less shining than *P. minimus*, the elytra somewhat closely punctulate, the pubescence more conspicuous, the posterior tibiae (♀) produced into a long spiniform process, as in the same sex of *Attalus fuscescens* (= *calcaratus*), Gorh. (an insect here referred to *Anthocomus*) and *A. varicus*. Erichson's type (♀) of *A. seminulum*, from Caracas, has more distinctly punctate elytra, the tibiae (the extreme apex of the posterior pair excepted) and tarsi testaceous, and the posterior tibiae of the female unarmed.

3. *Pseudattalus punctatus*.

Ebaeus punctatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 321.

♀. Posterior tibiae strongly arcuate, with one or two long, fine, spiniform, pallid setae amongst the shorter ones at the apex.

Hab. Panama, Chiriqui.

The three specimens seen of this species are probably all of the female sex, the male (?) noticed by Gorham having simple 5-jointed anterior tarsi; in this example antennae are a little longer and more slender, and the posterior legs are darker. The coarser puncturing of the elytra and the simple posterior tibiae (♀) separate *P. punctatus* from the same sex of *P. armatus*; and the cyaneous, more closely punctured elytra, and the more bowed, darker posterior tibiae, distinguish it from *P. seminulum*.

Pseudebaeus.

Pseudebaeus, Horn, Trans. Am. Ent. Soc. iv, pp. 109, 118 (1872).

This North-American genus is characterised by the simple 5-jointed anterior tarsi in the two sexes, and the abruptly pallid, prolonged, hooked apices of the elytra in the male. The four known forms seem to be widely distributed in the Middle and Southern States, one of them, *P. oblitus* (Lec.), extending northward to Canada,

and another, *P. pusillus* (Say), reaching the highlands of Central Mexico. A description of the Mexican insect is appended, Horn's brief diagnosis of *P. pusillus* not quite tallying with that of Leconte and Say.* *Pseudebaeus* is the only genus known as yet from Mexico with appendiculate elytra in the male. It was unknown to Gorham.

1. *Pseudebaeus pusillus.* (Plate II, figs. 18, 18*a*, ♂.)

Malachius pusillus, Say, Journ. Acad. Phil. v, p. 170 (1825).
Ebaeus pusillus, Lec., Proc. Acad. Phil. 1852, p. 167.
Pseudebaeus pusillus, Horn, Trans. Am. Ent. Soc. iv, pp. 118, 119 (1872).

Moderately elongate, narrow, the head and the middle of the disc of the prothorax shining, the rest of the upper surface opaque and densely, minutely shagreened; black, the elytra violaceous or greenish, the four or five basal joints of the antennae, the legs (except the extreme base of the posterior femora in some examples), and the prolonged apical callosities of the elytra of the ♂, testaceous or flavous; clothed with very fine, ashy, sericeous pubescence. Head polished, obsoletely punctulate, including the eyes as wide as the prothorax in ♂, arcuately depressed in front and sulcate between the eyes anteriorly in ♂, transversely depressed in front in ♀; antennae slender, long, very feebly serrate, joints 5–10 gradually decreasing in length. Prothorax broader than long, strongly rounded at the sides anteriorly, obliquely narrowed behind, obsoletely foveate before the base. Elytra much broader than the prothorax, ample, covering the abdomen, subparallel and callose at the tip in ♂, widened posteriorly and with the apices conjointly rounded in ♀, the humeri tumid. Legs long and slender in both sexes.

♂. Elytral callosities oblong, very prominent, the apices each produced into a broad, vertical, flap-like appendage, enclosing the long, sinuous, inwardly directed hook, the upper margin of the vertical plate narrowly cleft and bifid as seen from in front or behind (fig. 18*a*).

Length 2¼–2½ mm. (♂ ♀.)

Hab. Southern United States; Mexico, Puebla (*Truqui, in Mus. Brit.*, ♂♀; *Mus. Oxon.*, ♀).

The above description was drawn up from one male and six females from "Mexico" (one only of which is labelled with a definite locality) before the identification with the

* He gives the elytra as black, instead of bluish or bluish-green.

N.-American *P. pusillus* was suspected. A very graceful insect extremely like *P. oblitus* (Lec.), a female of which from Michigan (*in Mus. Oxon.*) is before me, differing from the corresponding sex of that species in having the elytra longer, more finely shagreened, opaque, and less inflated posteriorly. *P. oblitus* is said by Horn to have the last segment of the abdomen yellow and deeply grooved in the male, whereas it is black and apparently ungrooved in the same sex of *P. pusillus*.

Sphinginus.

Sphinginus, Rey, Vésiculifères, p. 180 (1867); Abeille de Perrin, Ann. Soc. Ent. Fr. 1890, pp, 364, 396.

A very peculiar, Anthiciform Malachiid found by Mr. H. H. Smith in Guerrero, Mexico, is, in the absence of the male, provisionally referred to *Sphinginus*, with which it agrees in the structure of the head, palpi, antennae, and prothorax. *Temnopsophus*, Horn, type *T. bimaculatus*, from Louisiana, described from a single male example, is a somewhat nearly allied genus.* *Sphinginus* includes at present various Mediterranean forms, but its distribution may be similar to that of *Attalus*, *Anthocomus* and *Micromimetes*. *Troglops*, again, is another genus with a similarly shaped prothorax.

1. *Sphinginus* (?) *eburatus*, n. sp. (Plate II, fig. 19, ♀.)

♀. Elongate, narrow, opaque, scabrous; black, the prothorax (a small patch on each side excepted) rufous, the elytra with a narrow, transverse, smooth, ivory-white, raised median fascia extending from near the suture to close to the outer margin, the membranous portions of the abdomen whitish; indistinctly pubescent, the elytra also set with scattered, suberect, stiff black setae. Head large, about as long as broad (as seen from above), considerably developed and obliquely narrowed behind the eyes, densely scabroso-punctate; eyes large and prominent; antennae moderately long, feebly serrate, joints 3–10 decreasing slightly in length, all longer than broad; palpi slender, last joint of the maxillary pair acuminate-ovate. Prothorax longer than broad, oval, rather narrow, constricted before the base, a little smoother than the head; with a

* *Cephaloncus biguttatus*, Abeille de Perrin, from Syria, to judge from his figure (♀), is very like *Temnopsophus*. Westwood's type of *Cephaloncus* was from the Canaries. There is a specimen of *T. bimaculatus*, Horn, in the Hope Museum at Oxford.

broad, deep, arcuate furrow behind, the disc in front of it appearing gibbous. Scutellum transverse. Elytra comparatively short and broad, inflated posteriorly, leaving two abdominal segments exposed; densely scabroso-punctate. Legs slender. Wings fully developed. Length $2\frac{1}{6}$ mm.

Hab. Mexico, Rio Papagaio in Guerrero, Pacific slope, 1,200 feet (*H. H. Smith*).

The narrow, transverse, ivory-white callus extending across the middle of the disc of each elytron is a unique character amongst the known Malachiids. One specimen, captured in October.

Anthocomus.

Anthocomus, Er., Entomographien, p. 97 (1840) (part.); Horn, Trans. Am. Ent. Soc. iv, p. 109; Abeille de Perrin, Ann. Soc. Ent. Fr. 1891, p. 355.

The two small insects here referred to *Anthocomus* (type, *A. sanguinolentus*, F.) have the anterior tarsi of the male simply 5-jointed, and formed as in the female, *i. e.* there is no modification of the basal joints of the male front foot such as is to be found in *Attalus*, including those wanting the upper lobe to the second joint. The elytra in each of them are slightly compressed posteriorly in the male (due to some extent to shrinkage after death); but they are not appendiculate or prolonged at the apex. *A. fuscescens* (Gorh.) has the posterior tibiae of the female formed as in the same sex of *Attalus varicus* and *Pseudattalus armatus*. One male only of each species is at present available for examination.

1. *Anthocomus fuscescens.*

♂. *Attalus fuscescens*, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 319.

♀. *Attalus* (?) *calcaratus*, Gorh., loc. cit., t. 13, figs. 3, 3*a*.

♂. Anterior tarsi simply 5-jointed, 1–4 short, 5 as long as 2–4 united; posterior tibiae feebly curved; elytra subparallel.

♀. Posterior tibiae (fig. 3*a* of Gorham) strongly curved, produced at the apex into a long dentiform process which reaches as far as the apex of the first tarsal joint; elytra much widened posteriorly.

Hab. Panama, David, Tolé, and Taboga Island.

Gorham's description of *A. fuscescens* must have been taken from a male, as he does not allude to the peculiar form

of the hind tibiae of the female, except under *A. calcaratus*. The four specimens before me from Taboga include a pair remounted by him on the same piece of card, and labelled "*A. fuscescens*, type," the others being females. The elytra vary in colour from wholly black to livid testaceous with the base broadly and indeterminately black. The posterior femora are sometimes infuscate to near the tip. The eyes are large.

2. *Anthocomus viridescens*, n. sp.

Elongate, narrow, shining; black, the head (except at the antennal insertion) and prothorax aeneous, the latter with the margins and base testaceous, the elytra greenish, the basal joints of the antennae and the tarsal joints 1–4 testaceous or obscure testaceous, the femora and tibiae piceous; sparsely pubescent and also set with semierect bristly hairs. Head transverse, polished, with excessively minute scattered punctures; eyes moderately large; antennae short in both sexes. Prothorax convex, slightly broader than long, sparsely, minutely punctate. Elytra long, slightly widened posteriorly in ♂, a little more inflated behind in ♀, not much broader than the prothorax at the base; rugulose, closely, conspicuously punctate. Legs slender; posterior tibiae moderately curved and simple in both sexes.

Length 2 mm. (♂♀.)

Hab. Mexico (*Truqui, in Mus. Brit.*).

Two specimens, assumed to be sexes of the same species. *A. viridescens* agrees with *A. fuscescens* in having simple 5-jointed anterior tarsi in the male; but differs from it in the unarmed, feebly curved posterior tibiae of the female, the metallic coloration, the smaller eyes, the rugulose, conspicuously punctate elytra, etc. The elytra are obliquely compressed at the tip in the male.

Lemphus.

Lemphus, Er., Entomographien, p. 131 (1840); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 321.

1. *Lemphus serricornis.*

Lemphus serricornis, Gorh., loc. cit. p. 321, t. 13, fig. 5 (♂).

Hab. Panama, near the city and Taboga Island.

Two males and three females have been seen of this insect. A co-type (♀) of the Venezuelan *L. mancus*, Er.,

is before me. It is larger than *L. serricornis*; the head, antennae (the basal joints excepted), legs, and elytra (a short oblique streak before the middle of the disc excepted), are black; the prothorax is rufous, with a black patch on the disc in front; and the antennae are feebly serrate. The male of *L. mancus* is unknown. The antennae are serrate in both sexes of *L. serricornis*, these organs being long and acutely dentate in the male. Another species has been described by Pic, *L. albofasciatus*, from Brazil.

Dromanthus.

Dromanthus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 121, 322.

There is but little to add to Gorham's descriptions of the six species he included under *Dromanthus*, except to call attention to the peculiar structure of the posterior tarsi of the males of certain forms, only a single specimen (of *D. opacus*) having come to hand since 1886. The tarsi, it may be observed, are described as 4-jointed, the minute additional penultimate joint (formed exactly as in *Lemphus*) having been overlooked. *D. jucundus*, Gorh., would perhaps be better placed under *Lemphus*, in which the elytra are rather short, and the last three or four abdominal segments are exposed in both sexes; but as the male is unknown, it can remain under *Dromanthus* for the present. Various S.-American forms have recently been added to the genus by Pic.

1. *Dromanthus opacus*.

Dromanthus opacus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 122.

♂. Antennae with joints 5–10 broadly widened, becoming narrower outwards, 11 considerably narrower than 10; posterior tarsi with joint 1 curved and produced at the inner apical angle into a long slender process which reaches as far as the apex of 2, 2 also curved and elongated.

♀. Antennae with joints 3–10 sharply triangular, 3 as long as 4, 4–8 wider than 3.

Hab. Mexico, Playa Vicente and Cordova (*Sallé*), Teapa (*H. H. Smith*).

The description was made from a single immature ♀ example from Playa Vicente, Vera Cruz; the male is from Cordova.

2. *Dromanthus laticornis.*

Dromanthus laticornis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 322.

♂. Antennae with joints 4–11 very broadly widened, 11 not much narrower than 10; posterior tarsi with joint 1 curved, slightly produced at the inner apical angle, 2 short, not longer than in ♀.

♀. Antennae with joints 4–11 narrower, shaped very much as in same sex of *D. opacus.*

Hab. Panama, Chiriqui.

Three specimens seen, one of which, marked "type" by Gorham, is a male. This insect is extremely like *D. opacus*, but is separable therefrom by the broader antennae and less elongated basal joints of the posterior tarsi of the male, and the much less acutely serrate intermediate antennal joints of the female. The colour, sculpture, and vestiture of the prothorax and elytra are precisely similar.

3. *Dromanthus nitidicollis.*

Dromanthus nitidicollis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 322, t. 13, fig. 6.

♂. Antennae with joints 5–10 very broadly widened, acute at the inner apical angle, 11 elongated, narrower, and yellow; posterior tarsi with joint 1 curved and produced at the inner apical angle into a long slender process which reaches as far as the apex of 2, 2 also curved and elongated.

Hab. Panama, Bugaba.

Described from two males. This insect has the posterior tarsi of the male formed as in the same sex of the Mexican *D. opacus*, from which it is separable by the yellow apical joint of the antennae and the flatter and more shining prothorax. The antennae are less widened than in *D. laticornis*, ♂, and the posterior tarsi differently formed. The tarsal structure is not mentioned in the description or shown in the figure of *D. nitidicollis.*

4. *Dromanthus decipiens.*

Dromanthus decipiens, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 122, t. 7, fig. 5.

♂. Antennae with joints 4–10 moderately broad and acutely triangular; posterior tarsi simple.

Hab. Panama, Chiriqui.

The specimen reserved for the "Biologia" collection is the male labelled by Gorham as the type. The antennal joints 4–10 are acutely serrate, as in the female of *D. opacus*. *D. decipiens* has the elytra closely, rather coarsely punctate, and shining.

5. *Dromanthus quadrimaculatus.*

Dromanthus quadrimaculatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 122, t. 7, fig. 4.

Hab. Nicaragua, Chontales.

The unique type of this insect appears to be a female. It has the general facies and colour of a spotted *Collops*. The antennal joints 5–10 are moderately widened and serrate. The marginal fold of the elytra is very conspicuous.

6. *Dromanthus jucundus.*

Dromanthus jucundus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 123, 323, t. 7, fig. 6.

Hab. Panama, Chiriqui.

There are five specimens of this remarkable insect in the "Biologia" collection, probably all females, to judge from their comparatively small head, short, sharply serrate antennae, and simple posterior tarsi.

Fam. MELYRIDAE.

Subfam. Dasytinae.

Holomallus.

Holomallus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 325 (1886).

The type (♂) of this genus, *H. aurivillus*, Gorh., is closely related to *Trichochrous* (sensu Casey), differing from it in the less prominent humeri and the oblong-ovate general shape of the body, this being especially noticeable in the male. The antennae have the five outer joints widened into a definite club, as in *T. femoralis* (Gorh.), and the tibiae are as closely and strongly spinulose as in *T. arcuaticollis* and its allies. The female of *H. serripes* has the general facies of a *Byturus*.

1. *Holomallus aurivillus.*

Holomallus aurivillus, Gorh., loc. cit. p. 326.

♂. Tibiae with two short stout spurs; fifth ventral segment broadly truncate at the apex, leaving the long, excavate, sixth segment exposed.

Hab. Mexico, Puebla.

2. *Holomallus serripes*, n. sp. (Plate II, fig. 20, ♂, anterior tibia.)

♂. Oblong-ovate, rather convex, the head and prothorax opaque, the elytra somewhat shining; nigro-piceous, the elytra reddish-brown or aeneo-piceous, the antennal joints 2–6 and the legs ferruginous or fusco-ferruginous; thickly clothed with rather long, coarse, pallid, shaggy, decumbent hairs, the head and prothorax with intermixed erect hairs, the marginal cilia of the elytra long, curled, and closely placed. Head small, short, densely, finely, rugulosely punctate; antennae short, the five outer joints widened into an elongate club, 7–10 strongly transverse, 9 and 10 wider than 8, 11 short-ovate, narrower than 10, 5 not larger than 6. Prothorax strongly transverse, broad, greatly rounded at the sides, narrowing from near the base, the latter sinuate; densely, finely punctate. Elytra broad, somewhat oval, the humeri not prominent, the lateral carina conspicuous; densely, moderately finely punctate. Fifth ventral segment truncate at the tip. Legs rather stout; tibiae closely and strongly spinose along their outer edge (fig. 20), the anterior and intermediate pairs with two short, stout, approximate spurs.

♀. Narrower, the prothorax smaller, the elytra subparallel in their basal half, the tibial spurs smaller and more slender.

Length 4–4½, breadth 1¾–2⅛ mm. (♂♀.)

Hab. Mexico (*Truqui, in Mus. Brit.; Mus. Oxon.*).

Thirteen specimens. Very like the unnamed abraded *Holomallus* (♀) from Puebla mentioned by Gorham (loc. cit. p. 326); but with the vestiture almost wholly decumbent, except on the head and prothorax, the elytra much more finely punctate, etc. The Puebla insect is too worn to describe. *H. aurivillus* is thickly clothed with extremely long, fulvous, shaggy hairs.

Trichochrous.

Trichochrous, Motschulsky, Bull. Mosc. ii, p. 393 (1859); Casey, Ann. N. York Acad. Sci. viii, pp. 458, 466 (1895); Fall, Trans. Am. Ent. Soc. xxxiii, pp. 236–240 (1907).

Pristoscelis, Leconte, Class. Col. N. Am. p. 193 (1861) (part., *nec* Woll.); Gorham, Biol. Centr.-Am., Coleopt. iii, 2, pp. 123 (1882), 327 (1886).

Cradytes, Casey, loc. cit. pp. 458, 533.

Casey, in his Revision of the N.-American Melyrinae, restricts *Pristoscelis* to the Californian *P. grandiceps*, Lec., and places the other species usually referred to that genus under *Trichochrous*, Motsch., the former having "the epistoma obsolete and the frontal margin of the head beaded throughout its entire width." *Cradytes* has already been sunk by Fall as untenable. *Trichochrous* appears to be one of the largest genera of N.-American Coleoptera, and its species are said to occur in unnumbered scores in the western regions of that continent; 87 are enumerated by Casey, nearly 40 of which are described by him as new from single examples, and various others have since been added by Fall. Gorham had very little material, even when he finished his Supplement in 1886, nine only being mentioned by him. This number is now raised to 29, mainly from the Mexican collections made by Truqui, Höge, and H. H. Smith, one species only, and that from the summit of the Volcan de Fuego, being known as yet from Guatemala. Amongst the various genera made by Casey at the expense of *Trichochrous*, one at least of which was made on a secondary sexual character, *Cradytes* is known to me from Mexico, and it is just possible that some of the forms here referred to *Trichochrous* may prove to be better placed in *Sydates* or *Sydatopsis*. The Mexican species enumerated below show a complete gradation in the structure of the antennae, the forms placed at the head of the genus having the joints from the fifth, sixth, or seventh broadly serrate and progressively widened, and those placed towards the end having the intermediate joints more slender and irregularly serrate (5 and 7 being often wider than 6 or 8) and the last three dilated into a definite club.

Key to the Mexican and Guatemalan species of Trichochrous (= *Pristoscelis*, Gorh.).

A. Prothorax with the lateral margins conspicuously serrate, crenulate, or hooked, and sometimes greatly elongated, in ♂; tibiae feebly, sparsely spinulose; antennae with joints 7–10 broad, strongly serrate . . . . . [CRADYTES, Casey.]

a. Prothorax (♂) subquadrate, with distinct anterior angles.

a^1. The lateral margins sharply serrate anteriorly . . . . . *denticulatus*, n. sp.

b^1. The lateral margins sharply hooked anteriorly . . . . . *hamatus*, n. sp.

b. Prothorax (♂) very elongate, the anterior angles obliterated, the lateral margins closely crenulate anteriorly . *crenulatus*, n. sp.

B. Prothorax with the lateral margins not conspicuously serrate in ♂, at most obsolete crenulate in the two sexes . [TRICHOCHROUS, Motsch.]

c. Antennae abruptly serrate from joint 5, the latter not or very little broader than 6 (except in *T. fuscovittatus*).

c^1. Tibiae closely, strongly spinulose; antennae and legs stout, antennal joints 5–10 becoming progressively wider.

a^2. Upper surface with intermixed erect black setae.

a^3. Femora, tibiae, and tarsi rufescent, body wholly black . . *fulvipes*, Gorh.

b^3. Femora infuscate, tibiae, tarsi, and elytra rufescent . . . . *rufipennis*, Lec.

b^2. Upper surface without intermixed erect setae, the hairs semierect.

c^3. Elytra rufescent or violaceous; prothorax strongly rounded at sides; vestiture coarse and in great part pale . . . . *arcuaticollis*, n. sp.

d^3. Elytra cyaneous; prothorax less rounded at sides; vestiture fuscous . . . . . *cyanipennis*, n. sp.

d^1. Tibiae sparsely, strongly spinulose; antennal joints 5–10 subequal in width; elytra truncate at apex; body black, shining, broad; vestiture fine, decumbent . . . . *truncatipennis*, n. sp.

e^1. Tibiae more feebly spinulose.

c^2. Legs black; upper surface with numerous intermixed erect setae, the general vestiture close; prothorax (♂) large; antennal joints 5–10 becoming progressively broader.

e^3. Elytra elongate, closely punctured: species large . . . *pubescens*, Gorh.

f^3. Elytra short, rugosely punctured, dull: species smaller . . *dilaticollis*, n. sp.

d^2. Legs partly or entirely red; antennae less widened outwards.

g^3. Upper surface with intermixed erect setae; vestiture long.

a^4. Femora, tibiae, and tarsi red; elytra broadly fusco-vittate, the whitish hairs along suture and sides very long and fine . . . . . *fuscovittatus*, n. sp.

b^4. Tibiae and tarsi red; elytra aeneous, not vittate; joint 11 of antennae shorter.

a^5. Antennae with intermediate joints rufescent; prothorax more rounded at sides . . . . . *paleatus*, n. sp.

b^5. Antennae black; prothorax less rounded at sides . *fuscicornis*, n. sp.

c^4. Tarsi only red; elytra aeneous; joint 11 of antennae long . *rufitarsis*, n. sp.

h^3. Upper surface without intermixed setae; vestiture fine; legs red . . . . . *hidalgoanus*, n. sp.

d. Antennae (except in *T. diversicornis*, ♂) more feebly and regularly serrate from joint 5, 9–11 not abruptly wider than 8; tibiae feebly or obsoletely spinulose.

f^1. Upper surface with numerous intermixed erect setae; prothorax oblong, subglobularly convex; antennae (♂) moderately long; body black; legs red . . . . . *mexicanus*, Casey.

g^1. Upper surface with a few intermixed erect setae.

e^2. Antennae long and with joints 4–10 triangular in ♂, much shorter and serrate from joint 5 in ♀; prothorax transverse; body aeneous, shining; legs red . . . *diversicornis*, n. sp.

f^2. Antennae short, feebly subequally serrate; prothorax oblong; body aeneous; legs piceous; tibiae obsoletely spinulose . . . . *salvini*, Gorh.

e. Antennae abruptly serrate from joint 6, 6–10 strongly transverse, becoming progressively broader; body nigro-aeneous; legs piceous; upper surface with intermixed semierect bristly hairs . . . . . *clavatus*, n. sp.

f. Antennae abruptly serrate from joint 7, 7–10 broad; body aeneous, thickly set with numerous intermixed erect setae; tibiae and tarsi red . . . . . *femoralis*, Gorh.

g. Antennae feebly, irregularly serrate from joint 5, 5 larger than 6, 9–11 widened into a more or less distinct club; tibiae feebly or obsoletely spinulose, and often setose.

h^1. Elytral epipleura much widened anteriorly, the marginal carina prominent; upper surface with numerous intermixed erect setae; body nigro-aeneous; antennae and legs black.

g^2. Prothorax densely, rugosely punctured, dull . . . . . *aeneipennis*, Gorh.

h^2. Prothorax more sparsely punctate, shining . . . . . *nigroaeneus*, Gorh.

i^1. Elytral epipleura narrow.

i^2. Body black, aeneous, or greenish; antennae and legs black or piceous.

i^3. Upper surface with intermixed erect setae.	
d^4. Body subcuneiform in ♂, oblong in ♀	*subcuneatus*, n. sp.
e^4. Body oblong in both sexes.	
c^5. Setae very long; fifth ventral segment (♂) not foveate	*setiger*, n. sp.
d^5. Setae shorter; fifth ventral segment (♂) very deeply foveate	*foveiventris*, n. sp.
j^3. Upper surface without erect setae.	
f^4. Form (♂♀) oblong.	
e^5. Prothorax closely punctate; body rather convex, surface coarsely punctate .	*nigripes*, n. sp.
f^5. Prothorax sparsely punctate; body slender, more depressed, surface finely punctate	*viridulus*, n. sp.
g^4. From (♂) oblongo-conic; body robust, vestiture coarse .	*conicus*, n. sp.
j^2. Body ferruginous; vestiture decumbent, fine: species very small	*ferrugineus*, Gorh.

1. *Trichochrous denticulatus*, n. sp. (Plate II, fig. 21, ♂, prothorax.)

♂. Elongate, parallel-sided, shining; black, with a faint brassy lustre, the elytra greenish, the tarsi piceous; clothed with shaggy cinereous hairs intermixed with an abundance of long erect black setae. Head closely punctate; antennae moderately long, the joints preceding the terminal one broad and strongly transverse. Prothorax subquadrate, along the median line about as long as broad, abruptly and obliquely narrowed anteriorly to the advanced apical portion, the sides armed with six or more projecting teeth which become longer and stouter towards the apex and obsolete towards the base, the hind angles obtuse; rather sparsely punctate on the disc, more closely so towards the sides. Elytra long, widest at the base, compressed below the humeri; closely, coarsely punctate, rugose before the middle. Beneath densely punctate, the anterior portion of the prosternum transversely wrinkled; fifth ventral

segment unimpressed, truncate at the apex. Tibiae rough, feebly spinulose and densely setose externally. Anterior femora thickened and truncated at the apex within.

♀. Prothorax small, transverse, narrowing from the base, obsoletely crenulate or serrulate at the sides anteriorly, closely punctate; the elytra much wider than the prothorax, greenish or violaceous; legs shorter and more slender; anterior femora simple.

Length $3\frac{1}{2}$–$4\frac{3}{4}$ mm.

Hab. Mexico, Saltillo in Coahuila (♂ ♀), Villa Lerdo in Durango (♂) (*Höge*).

Five males and three females. Very near *T.* (*Cradytes*) *longicollis*, Casey, from Arizona, the females referred to it differing from the males in a similar way, the prothorax (♂) strongly denticulate at the sides anteriorly. *T. longicollis*, however, is described as having the latter (♂) gradually and broadly arcuate and convergent at apex, and with the angles completely obliterated, whereas in the present insect the prothorax is abruptly and obliquely narrowed before the apex. The Arizona insect, moreover, is said to be black and considerably smaller; *T. denticulatus* has metallic elytra.

2. *Trichochrous hamatus*, n. sp. (Plate II, fig. 22, ♂, prothorax.)

♂. Elongate, parallel-sided, shining; black with an aeneo-cupreous lustre, the antennae and legs fusco-ferruginous; clothed with coarse, shaggy cinereous hairs intermixed on the head and prothorax and the base of the elytra with erect blackish setae. Head closely punctate; antennae short, the joints preceding the terminal one broad and strongly transverse. Prothorax subquadrate, along the middle line nearly as long as broad, obliquely and abruptly narrowed anteriorly to the advanced apical portion (as seen from above) and armed on each side at this place with a long, curved, downwardly and forwardly directed, hook, the margins obsoletely crenulate, the hind angles obliterated; rugulose, and finely, closely confusedly punctate. Elytra moderately long, widest at the base, transversely rugose and coarsely, closely punctate. Beneath densely punctate, the anterior portion of the prosternum transversely wrinkled; fifth ventral segment unimpressed, truncate at the apex. Tibiae rough, feebly spinulose and densely setose externally.

Length $4\frac{1}{3}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

One specimen, distinguishable at once by the single long curved hook or claw on each side of the prothorax towards the apex, the hook here replacing the row of small marginal teeth present in *T. denticulatus*.

3. *Trichochrous crenulatus*, n. sp. (Plate II, fig. 23, ♂, prothorax.)

♂. Elongate, parallel-sided, shining; black, with a brassy lustre, the elytra cyaneous, the tibiae and tarsi wholly or in great part ferruginous; thickly clothed with pale brownish shaggy hairs intermixed with long erect black setae. Head densely punctate; antennae short, joints 7–10 broad and strongly transverse. Prothorax considerably longer than broad, parallel-sided, the sides arcuately converging at the apex and closely crenulate to near the base, the apex arcuate-emarginate in the middle, the hind angles obliterated; closely, rather finely punctate. Elytra a good deal wider than the prothorax, subparallel in their basal half; rugose and densely punctate. Beneath densely punctate, the anterior portion of the prosternum almost smooth, the narrow post-coxal portion dentiform; fifth ventral segment truncate at the apex. Tibiae rough, feebly spinulose and densely setose externally, the anterior pair curved. Anterior femora compressed and hollowed at the middle within.

♀. Prothorax small, transverse, narrowing from the base, obsoletely crenulate at the sides; legs shorter and more slender.

Length 4–4⅝ mm. (♂♀.)

Hab. Mexico, Guadalajara (♂ ♀), Chilpancingo (♂), and Zapotlan (♀) (*Höge*).

Six males and three females, the latter, as in *T. denticulatus*, differing greatly from the males in the shape and armature of the prothorax. The cyaneous elytra and ferruginous tibiae and tarsi are, however, characters common to the two sexes.

4. *Trichochrous fulvipes*.

Pristoscelis fulvipes, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 328.

Hab. Mexico, Aguas Calientes city (*Höge*); ?? Guatemala.

Gorham described *T. fulvipes* from a single (♀) example from "Guatemala." This locality is almost certainly incorrect, due to some mistake in labelling, no insect of

the kind being known from that country. Moreover, we now have three (♀) examples of a *Trichochrous* from Aguas Calientes, Mexico, that must be referred to the same species. It is chiefly recognisable by its shining black body, thickly clothed with long, decumbent, shaggy pallid hairs, intermixed with scattered erect black setae; the wholly ferruginous, rather stout legs; the closely, strongly spinulose tibiae; and the broad, sharply serrate antennae. The elytra are densely, moderately coarsely, the prothorax finely and rather sparsely, punctate; the epistoma is flattened. Three abraded examples (♀) from Paso del Norte, with shorter hairs and more finely punctured elytra, may also belong here. The pallid hairs are very long in the type.

5. *Trichochrous rufipennis.*

Dasytes rufipennis, Lec., Proc. Acad. Phil. 1858, p. 71.
Pristoscelis rufipennis, Lec., op. cit. 1866, p. 356; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 327.
Trichochrous rufipennis, Casey, Ann. N. York Acad. Sci. viii, pp. 472, 516.

Hab. North America, Gila, Arizona; Mexico, Puebla.

The single female specimen from Puebla referred by Gorham to this species agrees with Casey's brief description of the abraded type, except that no mention is made of the numerous intermixed erect dark setae on the prothorax and elytra, these being conspicuous in the Mexican insect. The latter has the elytra, tibiae, and tarsi ferruginous; the tibiae closely and strongly spinulose externally; the elytra broad, rather finely punctate, with the marginal carina feebly developed and completely invisible from above; the antennal joints 5–10 strongly transverse, becoming progressively wider outwards. Amongst the Mexican forms it can only be compared with *T. arcuaticollis*, which has a more rotundate prothorax, more coarsely punctate, narrower elytra, etc.

6. *Trichochrous arcuaticollis*, n. sp.

♂. Elongate, subcylindrical, shining; black, the elytra varying in colour from violaceous with the apex rufescent to entirely ferruginous, the violaceous suffusion sometimes reduced to a common triangular scutellar patch or to an anteriorly dilated sutural stripe, the antennae in part or entirely, the apical one or two ventral seg-

ments, the tibiae and tarsi, and sometimes the femora also, ferruginous; thickly clothed with long, coarse, pallid hairs, the elytra with still longer marginal cilia. Head densely, rugosely punctate, the epistoma broad; antennae stout, short, joints 5–10 strongly transverse, becoming progressively broader outwards, 11 narrower than 10. Prothorax transverse, rather convex, strongly rounded at the sides, the base slightly hollowed laterally (the truncated median portion thus appearing narrow), the hind angles obliterated; closely, very coarsely punctate. Elytra elongate, a little wider than the prothorax, rather convex, subparallel to beyond the middle, the marginal carina moderately prominent and just visible from above; closely, coarsely punctate throughout. Beneath densely, finely punctate; fifth ventral segment unimpressed, truncate at the apex. Legs stout, the tibiae closely spinulose and thickly setose.

♀. Prothorax smaller, and narrowed from about the basal third forwards; fifth ventral segment ferruginous at the apex only, the latter rounded.

Length $4\frac{3}{4}$–$6\frac{1}{10}$ mm. (♂♀.)

Hab. Mexico (*Truqui, in Mus. Brit.*: ♂ ♀), Venta de Zopilote in Guerrero, 2,800 feet (*H. H. Smith*: ♂).

Nine males and one female, showing a complete gradation in the colour of the elytra, from violaceous (the apex excepted) to ferruginous. An elongate, subcylindrical form, with a transversely rotundate prothorax and very coarsely punctate upper surface, clothed with long, shaggy, pallid hairs, without intermixed darker erect setae, the tibiae closely spinulose externally. *T. mexicanus*, Casey, from North Mexico, seems to be nearly allied; but as it is said to have an unusually elongate prothorax in the male and feebly serrate antennae, it must be different from the present species. The insect (♀) referred by Gorham to *T. rufipennis* (Lec.) is more finely punctate above, and has erect black setae intermixed with the pallid hairs.

7. *Trichochrous cyanipennis*, n. sp.

♀. Elongate, robust, somewhat depressed, moderately shining; black, the elytra cyaneous, the apices of the latter, the third and fourth antennal joints, the apices of the femora, the tibiae and tarsi, and the tip of the last ventral segment, rufescent; thickly clothed with long fuscous hairs, without intermixed, erect, longer setae, the marginal cilia of the elytra very long, the hairs on the legs and under surface pale brown. Head short, densely, rugosely punctate,

the epistoma flattened; antennae short, stout, joints 5–10 strongly transverse, becoming progressively wider outwards. Prothorax short, transverse, narrowed anteriorly, the hind angles obliterated, the base feebly sinuate towards the sides; densely, coarsely punctate, the punctures here and there longitudinally confluent, with an indication of a smooth median line towards the base. Elytra elongate, considerably wider than the prothorax, subparallel in their basal half, the marginal carina moderately prominent; closely, coarsely punctate. Beneath very densely, finely punctate. Legs stout, the tibiae closely spinulose and setose.

Length 5–5½ mm.

Hab. MEXICO (*Truqui, in Mus. Brit.*).

Two females. Very like the single known specimen of the same sex of *T. arcuaticollis*, but less convex, with the prothorax broader behind and less sinuate at the base, the vestiture almost wholly fuscous above. In one example the elytra are rather broadly and abruptly rufescent at the apex.

8. *Trichochrous truncatipennis*, n. sp.

♂. Elongate, rather broad, moderately convex, shining; nigropiceous, the antennal joints 2–5 obscure ferruginous; somewhat thickly clothed with fine, pallid, adpressed hairs, without intermixed setae, the marginal cilia of the elytra long, those along the lateral margins of the prothorax short and closely placed. Head densely punctate, the epistoma short and flattened; antennae short, moderately stout, joints 5–10 strongly transverse, 5 larger than 6, 6–10 subequal. Prothorax broad, transverse, convex, feebly rounded at the sides, arcuately narrowed anteriorly, the base sinuate, the hind angles obliterated; closely, finely punctate. Elytra slightly wider than the prothorax, parallel in their basal half, sinuato-truncate at the apex, the sutural angle sharp, the marginal carina rather prominent, the epipleura a good deal widened anteriorly; closely, somewhat finely punctate, the punctures becoming a little coarser towards the base. Fifth ventral segment unimpressed, broadly truncate at the apex. Legs rather stout; tibiae with several spinules on their outer edge, those on the anterior and intermediate pairs long.

Length 4⅛, breadth 2 mm.

Hab. MEXICO, near the city (*Höge*).

One male. Differs from all the allied forms in the truncate apices of the elytra, the fine punctuation, the non-setose, finely, uniformly pubescent upper surface, the

sparsely, strongly spinulose anterior and intermediate tibiae, and the rather broad, black, shining body.

9. *Trichochrous pubescens.*

Pristoscelis pubescens, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 124.

♂. Prothorax large, as wide as the elytra, more rounded at the sides and less transverse than in ♀; anterior and intermediate tibiae with a rather stout blunt spur at the inner apical angle; fifth ventral segment unimpressed, broadly truncate at the apex.

Hab. Mexico, Guanajuato (*Sallé*: type, ♀), Lagos and Aguas Calientes city (*Höge*: ♂ ♀).

The types of this species are females. Höge subsequently sent us a good series from the State of Aguas Calientes, including both sexes. A rather large, elongate form, with the body nigro-aeneous, and thickly clothed with long decumbent pale brownish hairs intermixed with an abundance of erect black setae; the puncturing dense and rather fine, even on the elytra; the tibiae sparsely spinulose externally; the legs, antennae, and palpi wholly black; the antennal joints 5–10 strongly transverse, becoming progressively wider; the head very densely punctate, the epistoma flattened.

10. *Trichochrous dilaticollis*, n. sp.

Pristoscelis fuscus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 328 (*nec* Lec.).

♂. Elongate, moderately shining; black, the elytra with a faint brassy lustre, the legs piceous, the anterior femora reddish beneath; thickly clothed with long decumbent cinereous hairs intermixed with scattered, erect, pallid and black setae, the marginal cilia long. Head densely, rugosely punctate, the epistoma flattened; eyes very large; antennae short, rather stout, joints 5–10 strongly transverse, becoming progressively wider. Prothorax very large, as wide as the elytra, broader than long, gradually, arcuately narrowed anteriorly, the angles obliterated; densely, finely punctate. Elytra moderately long, parallel in their basal half, the epipleura narrow; densely, finely, rugosely punctate. Fifth ventral segment feebly emarginate at the apex. Tibiae sparsely spinulose externally, the anterior and intermediate pairs with a very short, blunt, truncated tooth at the inner apical angle.

Length $3\frac{3}{4}$ mm.

Hab. Mexico, Pinos Altos in Chihuahua (*Buchan-Hepburn*).

One male, doubtfully referred by Gorham to *T. fuscus* (Lec.). Separable from the allied Mexican forms by the greatly developed prothorax in the male, the large eyes, the short, stout, strongly serrate antennae, the parallel-sided, comparatively short, densely rugulose, dull elytra, the dense, double vestiture, and the distinctly spinulose tibiae.

11. *Trichochrous fuscovittatus*, n. sp.

Pristoscelis suturalis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 327 (*nec* Lec.).

♂. Oblong, robust, shining; black, the mouth-parts, antennae and palpi (except at the tips), and legs, and the epipleura (except at the base) and apical margin of the elytra, ferruginous; the head, prothorax, and scutellum, and the suture, sides and apex of the elytra, thickly clothed with long, adpressed, cinereous hairs intermixed with extremely long, fine, pallid, erect hairs, the disc of each elytron broadly fusco-pilose (thus appearing vittate), the marginal cilia extremely long and fine. Head closely, minutely punctate, the epistoma smooth and tumid in the middle; antennae short, rather slender, joints 5–10 triangular, transverse, 5 much wider than 4 or 6. Prothorax convex, broader than long, strongly rounded at the sides, narrowed anteriorly, the angles obliterated; closely, minutely punctate. Elytra moderately long, much wider than the prothorax, subparallel for some distance below the tumid humeri; closely, finely, asperato-punctate. Fifth ventral segment unimpressed, broadly truncate at the apex. Legs long, rather stout; tibiae spinulose externally, the anterior and intermediate pairs with a stout truncated spur at their inner apical angle; tarsi elongate, setose, the basal joint of the posterior pair obliquely produced at the apex beneath.

♀. Head smaller; antennae much shorter, joints 5–10 strongly transverse; prothorax smaller, more narrowed anteriorly; elytra shorter, widened posteriorly; legs shorter, the tarsi not nearly so elongate, the posterior pair simple.

Length 3–3½ mm. (♂♀.)

Hab. Mexico, Northern Sonora (*Morrison*).

Six males and one female. Casey (Ann. N. York Acad. Sci. viii, p. 511) has re-described *T. suturalis* (= *conformis*), Lec., from San Diego, California, and it is obvious that the Sonora insect has nothing to do with that species. The

broadly fusco-pubescent disc of the elytra, and the closely cinereo-pilose suture and apex, are characteristic. The intermixed pallid erect hairs are extremely long and fine. The sexual characters are strongly pronounced. *T. vittiger*, Casey, from New Mexico, is perhaps an allied form.

12. *Trichochrous paleatus*, n. sp.

♂. Moderately elongate, subcylindrical, shining; aeneo-piceous, the basal joints of the antennae (the first excepted) and the legs ferruginous, the knees or femora sometimes infuscate; thickly clothed with long, coarse, cinereous, decumbent hairs intermixed with scattered suberect black setae, the marginal cilia long. Head closely punctate, the epistoma tumid and smooth in the middle; antennae short, rather slender, joints 5–10 transverse, serrate, 5 a little broader than 6, 9 and 10 wider than 8. Prothorax convex, transverse, rounded at the sides, narrowed anteriorly, coarsely, closely punctate. Elytra subparallel, about as wide as the prothorax, bluntly, conjointly rounded at the apex; coarsely, closely punctate. Fifth ventral segment unimpressed, broadly truncate at the apex. Tibiae with a few scattered spinules along their outer edge.

♀. Prothorax smaller, less rounded at the sides, more narrowed anteriorly.

Length 3–3⅕ mm. (♂♀.)

Hab. Mexico, near the city, Pachuca (*Höge*).

Described from seven specimens from Mexico city, apparently all females but one. Very near *T. fuscicornis*, the decumbent cinereous hairs coarser, the antennae not wholly infuscate, the prothorax more rounded at the sides and in the male about as wide as the elytra. *T. texanus* (Lec.) is an allied darker form, with more numerous setae.

13. *Trichochrous fuscicornis*, n. sp.

♂. Elongate, subcylindrical, shining; aeneo-piceous, the tibiae and tarsi ferruginous; thickly clothed with shaggy pallid decumbent hairs intermixed with long, suberect, blackish setae, the marginal cilia very long. Head densely punctate, the epistoma smooth and tumid in the middle, the eyes rather depressed; antennae short, joints 5–10 transverse, serrate, 5 and 7 a little broader than 6 and 8, 9 and 10 about as wide as 7. Prothorax convex, broader than long, narrowed from near the base, coarsely, closely punctate. Elytra a little wider than the prothorax, subparallel in their basal

half, bluntly, conjointly rounded at the tip, transversely depressed below the base; coarsely, closely punctate, the punctures becoming finer towards the apex. Fifth ventral segment unimpressed, truncate at the apex. Tibiae with conspicuous scattered spinules along their outer edge.

Length 3⅓–3½ mm. (♂♀.)

Hab. Mexico (*Truqui, in Mus. Brit.*).

Six specimens, the females differing very slightly from the males, the exact locality not recorded. An elongate, subcylindrical, aeneous form, with the prothorax narrowed from near the base in both sexes, the tibiae and tarsi rufescent, the tibiae with a few conspicuous spinules, the general vestiture long.

14. *Trichochrous rufitarsis*, n. sp.

♂. Elongate, subcylindrical, shining; aeneo-piceous, the antennae black, the tarsi rufo-testaceous, except at the tip; sparsely clothed with fine pallid hairs intermixed with numerous long, erect, bristly hairs. Head densely punctate, the epistoma flattened; antennae rather long, joints 5–10 transverse, broad, triangular, 5 a little larger than 6, 11 stout, elongate, acuminate-ovate. Prothorax convex, rounded at the sides, narrowed anteriorly, closely punctate. Elytra slightly wider than the prothorax, subparallel in their basal half, conjointly rounded at the tip; closely, coarsely punctate. Fifth ventral segment unimpressed, truncate at the apex. Tibiae obsoletely spinulose externally.

Length 2$\frac{1}{6}$ mm.

Hab. Mexico, Oaxaca (*Höge*).

One male. Recognisable amongst the allied forms by its rufo-testaceous tarsi, rather long, sharply serrate antennae, with stout, acuminate apical joint, the closely punctured, convex prothorax, and the numerous intermixed erect bristly hairs on the upper surface. The sheath of the aedeagus (exposed in the type) is strongly curved, stout, and cylindrical, and acutely pointed at the tip beneath.

15. *Trichochrous hidalgoanus*, n. sp.

♂. Moderately elongate, subcylindrical, shining; aeneo-piceous, the palpi and antennae (except at the tip), and the legs, ferruginous; sparsely clothed with long, adpressed, fine, cinereous hairs, without intermixed erect setae, the marginal cilia curled and moderately long. Head closely punctate, the epistoma smooth and tumid in

the middle in front; antennae short, joints 5–10 triangular, becoming progressively wider, transverse, 11 ovate, narrower than 10. Prothorax transverse, as wide as the elytra, rounded at the sides, a little narrowed anteriorly, the angles obliterated; rather sparsely punctate, often with a narrow, smooth, impunctate space down the middle behind. Elytra subparallel, closely punctate, the punctures coarse at the base, becoming much finer towards the apex, the marginal carina moderately prominent. Fifth ventral segment unimpressed, truncate at the apex. Tibiae sparsely, finely spinulose externally.

♀. Prothorax less rounded at the sides and more narrowed anteriorly; elytra somewhat widened posteriorly.

Length $3\frac{1}{10}$–$3\frac{1}{5}$ mm. (♂♀.)

Hab. Mexico, Pachuca and Zacualtipan in Hidalgo (*Höge*).

A long series from Pachuca. Recognisable by the red legs and antennae, the latter being moderately serrate from the fifth joint, the rather sparse, wholly decumbent vestiture (the erect setae altogether wanting), the aeneo-piceous shining surface, the tumid median portion of the epistoma, etc.

16. *Trichochrous mexicanus.*

Trichochrous mexicanus, Casey, Ann. N. York Acad. Sci. viii, pp. 472, 515.

Hab. North Mexico (*coll. Levette*).

An oblong, strongly convex, feebly shining, black form, with rufescent legs and pallid antennae, and rather long, coarse, subdecumbent pubescence (which becomes darker and less conspicuous in an elongate dark streak on each elytron) intermixed with numerous long erect blackish setae; the prothorax subglobularly convex, nearly as long as broad, and coarsely, closely punctate; the elytra slightly wider than the prothorax, parallel, coarsely, densely punctate. Described from two males. Length $2\frac{3}{4}$ mm. Casey speaks of this insect as wholly different from any of the N.-American species described by him. He places *T. mexicanus* near *T. rufipennis*, Lec. It is unknown to me.

17. *Trichochrous diversicornis*, n. sp.

♂. Moderately elongate, narrow, shining; aeneo-piceous, the joints 2–4 of the antennae and the legs rufo-testaceous, the femora slightly infuscate; sparsely clothed with long, fine, pallid, decumbent

hairs with a few erect hairs intermixed, the marginal cilia long. Head very sparsely, finely punctate, the epistoma with a small, smooth, tuberculiform prominence; antennae long, serrate from the fourth joint, 4–10 triangular, 8–10 longer than broad, 11 elongate-ovate. Prothorax broader than long, convex, rounded at the sides, sinuously narrowed anteriorly; sparsely punctate on the disc, the punctures becoming more crowded towards the sides. Elytra broader than the prothorax, subparallel; closely, moderately coarsely punctate. Legs slender, long; tibiae sparsely and very distinctly spinulose externally.

♀. Broader, the elytra widest beyond the middle; antennae almost wholly testaceous (joint 1 excepted), much shorter, more slender, feebly serrate, joint 5 distinctly wider than 4 or 6, 9 and 10 about as broad as long.

Length 3 mm. (♂♀.)

Hab. Mexico, Northern Sonora (*Morrison*).

One pair, found placed with *T. fuscovittatus* (= *suturalis*, Gorh., *nec* Lec.) in the "Biologia" collection, the male partially abraded, the female in good condition. A slender, moderately elongate, cinereo-pilose, aeneo-piceous insect, with unusually elongate antennae in the male, the tibiae and tarsi and the basal joints of the antennae (the first excepted) rufo-testaceous. The antennae are serrate from the fourth joint in the male and from the fifth joint in the female.

18. *Trichochrous salvini.*

Pristoscelis salvini, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 124.

♂. Intermediate tarsi armed with a stout blunt spur at the inner apical angle.

Hab. Guatemala, summit of the Volcan de Fuego.

A narrow, elongate, aeneo-piceous insect, with the prothorax oblong, densely, finely punctate (except along an incomplete smooth median line); the elytra parallel-sided, densely, rather coarsely punctate; the antennae rather slender, joints 5–10 transverse, feebly serrate, 5 slightly larger than 6; the surface sparsely clothed with fine decumbent brownish pubescence intermixed with long fine erect hairs, these latter being conspicuous on the prothorax and along the margins of the elytra; the legs slender, scarcely stouter than in *Listrus*, the spinules only just traceable.

19. *Trichochrous clavatus*, n. sp.

♀. Moderately elongate, subcylindrical, rather convex, shining; nigro-aeneous, the antennae and legs piceous; sparsely clothed with intermixed decumbent and semierect longer bristly hairs, the latter very long at the sides of the prothorax and elytra. Head small, densely punctate; antennae short, much widened outwards, joints 6–10 strongly transverse, serrate, 5 small, 6 and 7 equal, wider than 5, 8–10 much broader than 7, 11 ovate, about as broad as long. Prothorax transverse, the sides arcuately converging anteriorly and subparallel towards the base; closely, very finely punctate, a little smoother along the median line. Elytra moderately long, considerably wider than the prothorax, parallel in their basal half, the marginal carina scarcely visible from above, closely, rather coarsely punctate. Tibiae rough, the anterior pair distinctly spinulose.

Length $3\frac{1}{4}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

One female. Very different from any of its Mexican allies, and recognisable by the five dilated outer joints of the antennae, the fifth joint being small; the short, very finely punctured prothorax; and the parallel-sided, rather broad elytra.

20. *Trichochrous femoralis.*

Pristoscelis femoralis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 328 (*nec* * Casey).

Hab. Mexico, Puebla.

The type of this insect is a female. It is compared by Gorham with *T. nigroaeneus*, from which it may be separated by its broader form, narrow epipleura, rufescent tibiae and tarsi, densely, finely punctate prothorax, less coarsely punctate elytra, much more abundant black setae, structure of the antennae, etc. The head is very densely punctured, the epistoma flattened. The antennae (♀) are short; joints 7–10 are strongly transverse, becoming progressively wider, 5 slightly larger than 6, 11 stout, ovate. The length is $4\frac{1}{10}$ (not 5) mm.

21. *Trichochrous aeneipennis.*

Pristoscelis aeneipennis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 327.

* Casey's name *femoralis* is preoccupied: *caseyi* is here substituted for it.

Hab. Mexico, Durango.

The types (2) of *T. aeneipennis* are males. This is a species with the fifth antennal joint triangular and much larger than the sixth, the joints 6 and 8 subequal, 9 and 10 broader and strongly transverse, 9–11 forming a well-defined club. The entire upper surface in aeneous, thickly clothed with intermixed erect black setae and decumbent cinereous hairs; the prothorax is narrowed anteriorly, sinuate laterally at the base, and so closely punctate as to appear reticulate; the elytra are broader than the prothorax, somewhat acuminate, sharply margined and with broad epipleura, and coarsely, closely punctate; the fifth ventral segment is truncate at the apex and unimpressed; the tibiae are rather slender, and set with long bristly hairs. The length is $4\frac{1}{2}$ (not 5) mm.

22. *Trichochrous nigroaeneus.*

Pristoscelis nigroaeneus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 124 (part.) (*nec* p. 327).

♂. Elongate, aeneo-piceous, shining; somewhat thickly clothed with intermixed decumbent cinereous hairs and long, erect, black setae, the marginal cilia very long. Head short, closely punctate; antennae with joint 5 larger than 6, triangular, 6 and 8 subequal, 9 and 10 broader and strongly transverse, 9–11 forming a definite club. Prothorax a little broader than long, rapidly and sinuously narrowing from about the basal third, coarsely, rather closely punctate. Elytra long, slightly wider than the prothorax, somewhat acuminate posteriorly, with the margins sharply carinate and very prominent as seen from above, the epipleura broad, gradually narrowing towards the apex; coarsely, closely punctate. Beneath densely, very finely punctate; fifth ventral segment unimpressed, truncate at the apex. Tibiae with a few minute scattered spinules along their outer edge, and also set with long hairs.

♀. Prothorax strongly transverse; antennae shorter.

Length $3\frac{1}{2}$–4 mm. (♂♀.)

Hab. Mexico (*Truqui, in Mus. Brit.*; *Mus. Oxon.*: ♂♀), Jalapa (*Höge*: ♂♀).

Gorham confused various species under this name, but he selected and labelled a male from Jalapa as the type, and there are various other Mexican examples found by Truqui in the British Museum. *T. nigroaeneus* is very

closely related to *T. aeneipennis*, and it is only separable therefrom by its less rugose prothorax. The relatively broad epipleura and very prominent marginal carina of the elytra bring these insects near *Asydates*, Casey.

23. *Trichochrous subcuneatus*, n. sp.

♂. Elongate, subcuneiform, shining; nigro-piceous, with a brassy lustre, somewhat thickly clothed with erect blackish bristly hairs intermixed with a few decumbent shorter pallid hairs, the marginal cilia long. Head densely punctate, the epistoma smooth and tumid along the middle; antennae short, joints 5–10 transverse, serrate, 5 larger than 6, 6 and 8 subequal, 9 and 10 much broader, 9–11 forming a definite club. Prothorax broader than long, large, convex, narrowed anteriorly; coarsely, closely punctate. Elytra long, not wider than the prothorax, narrowed from the base, narrowly, conjointly rounded at the apex; closely, coarsely punctate, the punctures becoming smaller towards the tip. Fifth ventral segment unimpressed, truncate behind. Tibiae rough, sparsely setose.

♀. Prothorax smaller, more narrowed anteriorly; elytra subparallel in their basal half.

Length 3–3¼ mm. (♂♀.)

Hab. Mexico, near the city [♂♀], Aguas Calientes city [♀] (*Höge*).

Described from a pair from Mexico city. This is the only Mexican *Trichochrous* known to me with the elytra narrowed from the base in the male. The vestiture is almost wholly erect and dark. The female is very different from the male, and it might easily be mistaken for another species.

24. *Trichochrous setiger*, n. sp.

Pristoscelis nigroaeneus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 124 (part.).

♂. Moderately elongate, shining, nigro-aeneous; clothed with scattered pallid decumbent hairs intermixed with many very long, erect, bristly hairs, the marginal cilia also very long. Head closely punctate, the epistoma slightly tumid in the middle; antennae short, joints 5–10 transverse, serrate, 5 larger than 6, 6–8 subequal, 9 and 10 wider, 11 ovate. Prothorax convex, transverse, rounded at the sides, narrowing from a little before the base, closely, rather coarsely punctate. Elytra very little wider than the prothorax,

subparallel in their basal half; the marginal carina rather prominent and just visible from above, the epipleura narrow; closely, coarsely punctate. Fifth ventral segment truncate at the apex, with a shallow triangular depression in the middle behind. Tibiae rough and setose.

♀. Prothorax smaller, more narrowed anteriorly; elytra broader, widest beyond the middle.

Length $2\frac{4}{5}$–$3\frac{1}{4}$ mm. (♂♀.)

Hab. Mexico, Oaxaca (*Sallé*).

Three males and two females. Smaller and less elongate than *T. nigroaeneus*, the prothorax shorter, more convex, and more rounded at the sides, the elytral margins less expanded, the epipleura narrow. The coarse puncturing and the very long intermixed erect hairs on the upper surface distinguish *T. setiger* from various other allied forms. In one of the two females the interspaces between the punctures on the head and prothorax are densely alutaceous and opaque.

25. *Trichochrous foveiventris*, n. sp.

♂. Elongate, narrow, feebly convex, shining; nigro-aeneous or aeneo-piceous, the antennae and legs black or piceous; clothed with rather long, decumbent, cinereous or brownish hairs, the head, prothorax, and sides of the elytra with intermixed erect, blackish, bristly hairs, the marginal cilia moderately long and curled. Head densely punctate, the epistoma smoother and slightly tumid in the middle; antennae moderately long, rather slender, joints 5–10 serrate, 5 triangular and larger than 6, 6–10 transverse, 9 and 10 a little wider than 8, 11 ovate. Prothorax transverse, rounded at the sides, narrowed anteriorly, the base distinctly sinuate laterally; closely, rather finely punctate. Elytra a little wider than the prothorax, subparallel in their basal half, with the marginal carina somewhat prominent and visible from above; closely, rugosely punctate. Fifth ventral segment truncate at the apex, with a large, deep, foveiform excavation extending nearly the whole length of the segment. Tibiae rough, setulose.

♀. Prothorax narrowed from near the base; elytra broader and less parallel; antennae shorter and more slender.

Length 3–$3\frac{1}{4}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*; *Coffin, in Mus. Oxon.*), Morelia in Michoacan [♂ ♀], Mexico city (*Höge*), Tehuantepec [♂ ♀], (*coll. Fry, in Mus. Brit.*).

A long series, including pairs from Morelia and Tehuantepec. This species is distinguishable amongst its allies by the very large deep fovea on the fifth ventral segment of the male. It is less setose than *T. setiger*, the puncturing of the upper surface is not quite so coarse, and the ventral excavation is larger and very much deeper. A female from Puebla with brown decumbent hairs included by Gorham (loc. cit. p. 327) under *T. nigroaeneus* seems to belong here. The double vestiture of the upper surface distinguishes *T. foveiventris* from *T. nigripes*.

26. *Trichochrous nigripes*, n. sp.

Listrus punctatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 126 (part.).

♂. Moderately elongate, rather convex, shining; aeneous or aeneo-piceous, the antennae and legs black or piceous; clothed with decumbent cinereous hairs, without intermixed erect setae, the marginal cilia short. Head densely punctate, the epistoma without definite prominence; antennae moderately long, joints 5–10 transverse, serrate, 5 a little larger than 6, 9 and 10 much wider than 8, 11 ovate. Prothorax transversely convex, rounded at the sides, narrowed anteriorly, closely, moderately coarsely punctate. Elytra scarcely wider than the prothorax, subparallel in their basal half, closely, coarsely punctate. Fifth ventral segment truncate at the apex, transversely depressed and shallowly foveate in the middle behind. Tibiae obsoletely spinulose externally.

♀. Prothorax more narrowed anteriorly, not quite so wide as the elytra, the latter widest beyond the middle.

Length $2\frac{1}{2}$–$3\frac{1}{10}$ mm. (♂♀.)

Hab. Mexico (*Truqui*), Omilteme, Soledad, Xucumanatlan, and Chilpancingo, in Guerrero, 4,600–8,000 feet (*H. H. Smith*), Jalapa? (*Höge*).

A long series from Guerrero, the Mexican specimens referred by Gorham to *Listrus punctatus* also belonging here. A small aeneous insect, with the vestiture cinereous and wholly decumbent, the marginal cilia short, the prothorax short and convex, the elytral puncturing coarse and close, the fifth ventral segment of the male transversely depressed and shallowly foveate before the apex. The puncturing of the upper surface is coarser in some examples than in others. The complete absence of long erect bristly hairs on the upper surface separates *T. nigripes* from

various allied forms. The Guerrero specimens are taken as the types.

27. *Trichochrous viridulus*, n. sp.

♀. Elongate, narrow, shining; greenish aeneous, the antennae black, the legs piceous; clothed with wholly decumbent, rather long, pallid hairs, the marginal cilia short and inconspicuous. Head bi-impressed in front, finely punctate, the epistoma smooth and tumid in the middle; antennae very short, joints 5–10 transverse, 5 larger than 6, 9 and 10 much broader than 8, 11 ovate. Prothorax transverse, a little narrower than the elytra, narrowed from near the base; finely punctate, except along the smooth incomplete median line. Elytra long, subparallel in their basal half, somewhat depressed; closely, rather finely punctate, the punctuation becoming coarser at the base. Legs slender; tibiae distinctly spinulose externally.

Length 3¼ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*).

One female. This insect is not unlike *Listrus flavicornis*; but the antennae are very differently formed, the tibiae are distinctly spinulose, the posterior tarsi are much shorter, the prothorax is larger and more shining, etc. It cannot be compared with any of the other species of *Trichochrous* here enumerated. The puncturing of the upper surface is comparatively fine.

28. *Trichochrous conicus*, n. sp.

Pristoscelis nigroaeneus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 327 (part.).

♀. Elongate, subconical, shining; nigro-aeneous, the antennae and legs piceous, the tibiae and tarsi obscure ferruginous in one specimen; clothed with rather long, coarse, decumbent, cinereous hairs, without intermixed erect setae, the marginal cilia curled and long. Head small, densely punctate, the eyes not prominent; antennae very short, rather slender, joints 5–10 serrate, transverse, 5 broader than 6 or 8, 9 and 10 much wider than those preceding, 11 ovate. Prothorax not much broader than long, campanulate, closely, finely punctate. Elytra long, much wider than the prothorax, widening to beyond the middle, the marginal carina just visible from above; closely, moderately coarsely punctate, the interspaces transversely wrinkled. Tibiae rough and feebly spinulose.

Length (with head extended) 4–4⅛ mm.

Hab. Mexico, Monclova in Coahuila (*Dr. Palmer*).

Two females, quoted by Gorham in his Supplement under *T. nigroaeneus*, to which the present species bears no resemblance. The small head, campanulate prothorax, and posteriorly widened elytra, separate *T. conicus* at once from the females of all the other Mexican species of the genus known to me; the male may be differently shaped. The vestiture, too, though coarse, is wholly decumbent.

29. *Trichochrous ferrugineus.*

Listrus ferrugineus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 330 (1886).

Trichochrous exiguus, Casey, Ann. N. York Acad. Sci. viii, pp. 470, 497 (1895).

♂. Anterior and intermediate tibiae armed with a short, stout, blunt tooth at the inner apical angle; fifth ventral segment broadly truncate at the apex.

Hab. United States, Arizona; Mexico, N. Sonora.

A very small, Cryptophagiform insect, ferruginous in colour, with the head often broadly infuscate in the middle behind, the metasternum, and sometimes the abdomen also, and the tip of the antennae, black. The elytra are much broader than the prothorax in both sexes. The vestiture is wholly decumbent and flavescent, and the marginal cilia are long. The antennae are short, with joints 5–10 serrate, and transverse, 5 slightly larger than 6, and 9 and 10 much wider than those preceding. The tibiae are very feebly spinulose (when seen under the microscope), and the species is therefore not a true *Listrus*. Casey (op. cit. ix. p. 682) has already called attention to the synonymy. Three males and four females have been seen by me from Sonora.

Listrus.

Listrus, Motschulsky, Bull. Mosc. iv. p. 389 (1859); Gorham, Biol. Centr.-Am., Coleopt. iii, 2, pp. 125 (1882), 329 (1886); Casey, Ann. N. York Acad. Sci. viii, pp. 458, 540.

Thirty-two species of this genus are enumerated by Casey from N. America, one only of which is known to me from south of the Mexican border. *L. impressus*, Gorh., is here referred to *Dasytellus*, and *L. ferrugineus*, Gorh., to *Trichochrous*. The sixteen forms now recorded from

Mexico or Central America, eight of which are described as new, come very near some of the more feebly developed *Trichochrous*, differing from them in the non-spinulose slender tibiae. Amongst the N.-American representatives there are several with variegate pubescence, or with the elytra fasciate; but in the forms here dealt with the pubescence is uniform and entirely decumbent, the erect setae, present in many *Trichochrous*, being invariably absent. Two species of the present genus from the Ecuadorian Andes were described by Gorham in 1891.

Key to the Mexican and Central American species of Listrus.

a. Antennae long, slender, the penultimate joints (except in *L. subcupreus*) as long as broad, the fifth very little larger than the sixth.	
a^1. Anterior and intermediate tibiae of ♂ strongly curved, sinuate within, and toothed at apex.	
a^2. Fifth ventral segment of ♂ deeply excavate, and with two stout horn-like processes, the apical margin bearing a polished tubercle in the middle: species elongate .	*subcyaneus*, Gorh.
b^2. Fifth ventral segment of ♂ flattened, and without such processes.	
a^3. Fifth ventral segment of ♂ with a minute dentiform projection in middle behind: species larger and more elongate	*cupreonitens*, Gorh.
b^3. Fifth ventral segment simple: species much smaller . . .	*subcupreus*, n. sp.
b^1. Anterior and intermediate tibiae of ♂ not curved, the former toothed at apex	*flavicornis*, n. sp.
b. Antennae much shorter, the penultimate joints transverse, the fifth distinctly larger than the sixth, 9–11 forming a definite club.	
c^1. Prothorax gibbous, with the lateral margins sharply crenulate; body very shining, narrow, brassy; legs, and antennae in part, red . . .	*crenicollis*, n. sp.

d^1. Prothorax less convex, with the lateral margins very finely crenulate.
c^2. Vestiture long, coarse, and abundant.
c^3. Body metallic, the elytra at least shining; legs and antennae black; vestiture cinereous . . *senilis*, Lec.
d^3. Body olivaceous, opaque; antennae in part, and legs, red; vestiture white . . . . . *albidus*, n. sp.
d^2. Vestiture sparser.
e^3. Legs and antennae black; body aeneous or greenish: species moderately large.
a^4. Head very broad in ♂; body rather convex, shining, brassy *punctatulus*, n. sp.
b^4. Head not much wider in ♂ than in ♀; body more depressed.
a^5. Species larger; elytra much broader than prothorax in ♀ *versicolor*, Gorh.
b^5. Species smaller; elytra very little wider than prothorax in either sex . . . . *ciliatipennis*, n. sp.
f^3. Legs wholly or in part, and one or more of the antennal joints, red.
c^4. Femora (except in *L. corallipes*, var.) red; body metallic, shining.
c^5. Prothorax subquadrate; antennae longer and stouter: species larger and robust . *aeneus*, Gorh.
d^5. Prothorax transverse; antennae very short: species smaller.
a^6. Body more convex and less elongate; elytra conjointly rounded at tip . *corallipes*, Gorh.
b^6. Body rather depressed, more elongate; elytra subacuminate at tip . *aeratus*, n. sp.
d^4. Femora infuscate, tibiae and tarsi red; head and prothorax dull, elytra shining; body subcylindrical in ♂: species very small . . . . . *semiopacus*, n. sp.

e^4. Femora and tibiae in part infuscate; body shining, brassy: species very small . . . *metallicus*, Gorh.

c. Antennae short, the penultimate joints transverse, the fifth small, 8–10 forming a definite club; body nigro-aeneous or nigro-violaceous; antennae and legs infuscate, the latter sometimes reddish: species very small . . . . . *pygmaeus*, Gorh.

1. *Listrus subcyaneus.*

Listrus subcyaneus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 125.

♂. Anterior and intermediate tibiae strongly curved, sinuate within, sharply toothed at the inner apical angle; fifth ventral segment with a long, curved, stout, ciliate, horn-like process on each side of the broad median excavation, extending far beyond the apical margin of the segment, the latter with a small polished tubercle in the centre; antennae slender, feebly serrate, joints 5–10 subtriangular, 6–10 about as long as broad, 5 larger than 6, 11 stout, ovate; prothorax strongly rounded at the sides; body narrow.

♀. Antennae a little shorter; prothorax narrowing from about the basal third; body broader.

Hab. Guatemala, Totonicapam and Quezaltenango, in the Los Altos region.

Of the eight specimens seen of this insect, only two are bluish, the others being green or cupreous, the legs and antennae, too, vary, in colour from piceous to almost wholly testaceous. The sparse pubescence noticed by its describer is simply due to abrasion. The single male from Quezaltenango has the elytra very elongate, narrow, and cupreous, and the antennae, tarsi, and apices of the tibiae rufo-testaceous.

2. *Listrus cupreonitens.*

Listrus cupreonitens, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 125, t. 7, fig. 8 (♀).

♂. Anterior and intermediate tibiae strongly curved, sinuate within, toothed at the inner apical angle; fifth ventral segment unimpressed, with a minute dentiform projection at the middle of the apical margin; prothorax strongly rounded at the sides.

Hab. Guatemala, Quiché Mts., Quezaltenango, and near Capetillo.

This species is extremely like *L. subcyaneus*, differing from it in the simple fifth ventral segment of the male. The antennae and tarsi are equally variable in colour. The seven specimens seen are cupreous or plumbeo-cupreous in colour, the prothorax sometimes greenish or golden. The vestiture is very compact in fresh examples. The sexual characters were not described by Gorham. The length varies from 3 to nearly 4 mm.

3. *Listrus subcupreus*, n. sp.

♂. Moderately elongate, narrow, depressed, shining; obscure cupreous with the head and prothorax greenish, or wholly greenish, the antennae (except the first joint at the base above) testaceous, the legs piceous, with the tarsi fusco-testaceous; finely cinereo-pubescent. Head densely punctate; antennae slender, widening outwards, feebly serrate, joint 10 transverse, 11 stout, ovate. Prothorax small, strongly transverse, rounded at the sides, the hind angles subrectangular; closely, minutely punctate. Elytra wider than the prothorax, subparallel in their basal half, moderately elongate; densely, finely punctate. Fifth ventral segment flattened and densely punctate in the middle at the apex, the latter truncate. Anterior and intermediate tibiae bowed towards the apex, sinuate within, toothed at the inner apical angle.

♀. Broader; antennae with the four or five outer joints, and the basal one above, black, 6–10 transverse.

Length $2\frac{1}{4}$–$2\frac{1}{2}$ mm. (♂♀.)

Hab. Guatemala, Guatemala city, Dueñas, Capetillo (*Champion*).

Two males and three females, found mixed with the series named *L. canescens* by Gorham. Smaller and much less elongate than *L. cupreonitens* and *L. subcyaneus*, the antennae and legs shorter, the fifth ventral segment of the male simply flattened in the middle behind.

4. *Listrus flavicornis*, n. sp.

♂. Elongate, the head and prothorax dull, the elytra moderately shining; aeneous, the antennae (the black basal joint excepted), tarsi, and apices of the tibiae, testaceous; clothed with rather long, decumbent, pallid hairs, those on the elytra rather coarse, the curled marginal cilia of the latter long and conspicuous. Head bi-impressed in front, alutaceous, very finely, rather sparsely punctate;

antennae moderately long, slender, feebly serrate, joints 5–10 subtriangular, about as long as broad, 5 larger than 6, 11 ovate, much longer than 10. Prothorax small, transverse, the sides rounded posteriorly and as seen from above sinuate and obliquely converging anteriorly, the hind angles completely obsolete; finely punctate. Elytra much wider than the prothorax, subparallel in their basal half, conjointly rounded at the apex; densely, moderately coarsely punctate throughout. Legs long and slender; tibiae narrow, without definite spinules, the anterior pair sharply toothed at the inner apical angle; posterior tarsi elongate.

♀. Larger and broader, the antennae and tarsi infuscate towards the tip.

Length $3\frac{1}{4}$–$3\frac{1}{2}$ mm.

Hab. Mexico (*Truqui, in Mus. Brit.*, ♂; *Mus. Oxon.*, ♀). One male and two females. This species has the antennae formed very much as in the male of *L. cupreonitens* and its allies, except that the apical joint is not so large, but is not otherwise related to them. The tibiae are feebly setulose (when viewed under the microscope), but there are no definite spinules on their outer edge, and the insect, therefore, seems better placed in *Listrus* than in *Trichochrous*. The relatively small, laterally compressed prothorax is unusual in *Listrus*.

5. *Listrus crenicollis*, n. sp.

Listrus, sp., Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 329.

♂. Elongate, narrow, somewhat convex, shining; of a bright brassy tint, the antennae and legs rufo-testaceous, the apical three joints of the former and the tips of the tarsi infuscate; sparsely pubescent, the marginal cilia of the elytra rather long. Head sparsely, finely punctate; antennae short, rather slender, joints 5–10 serrate, 5 triangular, larger than 6 or 8, 6–10 transverse, 9 and 10 broader than those preceding, 11 short-ovate. Prothorax gibbous, nearly as long as broad, feebly rounded at the sides, narrowed from about the middle, the margins closely, conspicuously crenulate, the hind angles just traceable; closely, finely punctate. Elytra a little wider than the prothorax, subparallel in their basal half, conjointly rounded at the apex; closely and rather coarsely punctured in their basal third, the puncturing thence to the apex much finer and more diffuse. Legs rather slender, the posterior tarsi elongate.

Length $2\frac{1}{3}$, breadth 1 mm.

Hab. Mexico, Jalapa (*Höge*).

One specimen, assumed to be a male. Gorham hesitated to describe this species from a single example; but it is so distinct, and so closely allied to another form subsequently received from Orizaba, that there can be no risk in naming it. The narrow, bright aeneous body, the rather long gibbous prothorax, with conspicuously crenulate lateral margins, the rufous legs, and the long posterior tarsi are characteristic.

6. *Listrus senilis.*

Dasytes senilis, Lec., Proc. Acad. Phil. vi, p. 170 (1852).
Listrus senilis, Lec., op. cit. 1866, p. 358; Casey, Ann. N. York. Acad. Sci. viii, pp. 542, 551, and ix, p. 682.
Listrus canescens, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 126, 329 (*nec* Mann.).
? *Listrus clavicornis*, Casey, loc. cit. viii, pp. 542, 552.

♂. Anterior tibiae armed with a rather stout spur at the inner apical angle; prothorax nearly as broad as the elytra, rounded at the sides; fifth ventral segment truncate at the apex.

♀. Head and prothorax smaller, the latter less rounded at the sides.

Hab. United States, Kansas, Colorado, New Mexico, Arizona, Texas; Mexico; Guatemala; Panama.

A common N.-American species extending southward along the mountains to Chiriqui. In typical examples the prothorax is very densely punctulate and opaque; but amongst some of those before me from Guatemala the puncturing is more scattered and the interspaces shining, these latter doubtless belonging to *L. clavicornis*, Casey. The aeneous (not black, as stated by Casey) body, the uniform long, close, cinereous vestiture, and the black legs and antennae mainly distinguish *L. senilis*. Specimens from Texas (*Mus. Oxon.*) agree exactly with others before me from Mexico.

7. *Listrus albidus*, n. sp.

Moderately elongate, rather broad, opaque; fusco-olivaceous, the antennae (except the basal joint and one or more of the apical ones, which are infuscate) and legs (the tips of the tarsi excepted) rufo-testaceous; thickly clothed with adpressed white hairs, the marginal cilia short. Head very densely punctulate; antennae short, widened outwards, joints 5–10 serrate, 5 triangular, larger than 6, 6–10 transverse, 9 and 10 much broader than 8, 11 ovate.

Prothorax transverse, nearly as wide as the elytra, narrowing from near the base, the sides rounded posteriorly and obliquely converging forwards; very densely punctulate. Elytra moderately long, subparallel in their basal third; impressed with minute punctures, which are much more scattered than those on the prothorax. Legs comparatively short.

Length 2¾–3¼ mm.

Hab. MEXICO, Chilpancingo and Amula in Guerrero, 4,600–6,000 feet (*H. H. Smith*).

Four specimens, probably including both sexes, the supposed males having the prothorax a little more developed than the others; one female is in very fresh condition. The olivaceous, albo-pilose, opaque, minutely punctured upper surface and red legs are characteristic of the present species. *L. albidus* is related to *L. senilis*, Lec.

8. *Listrus punctatulus*, n. n.

Listrus punctatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 126 (part.), (*nec* Motsch.).

♂. Head very broad; antennae widened outwards, joints 5–10 serrate, 5 triangular, larger than 4, 6, or 8, these latter small, 6–10 transverse, 9 and 10 wider than 7, 11 short-ovate; prothorax large, as wide as the elytra, convex, rounded at the sides, narrowed in front; fifth ventral segment unimpressed, truncate at the apex.

♀. Head much smaller; antennae shorter and more slender; prothorax smaller, a little narrower than the elytra, narrowed from near the base.

Hab. GUATEMALA, Santa Rosa and San Gerónimo, both near Salama, in Baja Vera Paz.

Gorham confused various species under the name *L. punctatus*, the pair labelled by him as "types," and from which the brief description was evidently taken, being from Santa Rosa. The sexes differ greatly, the male having an unusually broad head and prothorax. In its robust build, the aeneous, rather coarsely cinereo-pubescent upper surface, and the strongly punctured basal portion of the elytra, *L. punctatulus* is very like certain *Trichochrous* (such as the Mexican *T. nigripes*), from which the smoother, non-setulose tibiae, the very short marginal cilia of the elytra, etc., will distinguish it. Three males and four females are before me. The specific name, as pointed out by Casey (Ann. N. York Acad. Sci. ix, p. 682), is preoccupied.

9. *Listrus versicolor.*

Listrus versicolor, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 126.

♂. Head broad; prothorax strongly rounded at the sides, gradually narrowed anteriorly, and also narrowed behind, about as wide as the elytra, the latter subparallel; fifth ventral segment truncate at the apex; anterior tibiae with a short, stout, blunt tooth at the inner apical angle.

♀. Prothorax smaller, narrowed from near the base; elytra broader and less parallel.

Hab. Guatemala, Ostuncalco [♀] and Quezaltenango [♂], in the Los Altos region.

The six specimens referred by me to *L. versicolor* (3 ♂ and 3 ♀) vary in colour from wholly greenish or bluish-green to green with the head and prothorax brassy or golden, the colour of the latter being partly due to the denser yellowish vestiture on these portions of the upper surface. The head and prothorax are densely and finely, the elytra rather coarsely, punctate. The two examples marked by the author as the " types " are large females from Ostuncalco, with broad, conspicuously margined elytra and long cilia. The abraded males from Quezaltenango are much narrower, but they seem to belong to the same species. These latter come extremely close to some of the forms of the very variable *L. senilis*, Lec., differing from them in the finer and more scattered vestiture.

10. *Listrus ciliatipennis*, n. sp.

Listrus punctatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 329 (*nec* p. 126).

♂. Moderately elongate, rather depressed, feebly shining; aeneous or greenish-aeneous above, black beneath, the legs and antennae piceous; clothed with fine adpressed cinereous pubescence, the curled marginal cilia of the elytra rather long and conspicuous. Head broad, densely, rugulosely punctate; antennae as in *L. punctatulus*. Prothorax about as wide as the elytra, transverse, rounded at the sides, narrowed in front; closely, minutely punctate, the interspaces usually dull and alutaceous. Elytra subparallel in their basal half, with rather prominent marginal carina; more coarsely and rugosely punctured in their basal third than on the rest of their surface, the punctures becoming minute towards the apex. Fifth ventral segment unimpressed, truncate at the apex. Legs slender.

♀. Head a little smaller; prothorax less rounded at the sides narrowed from near the base, distinctly narrower than the elytra.

Length $2\frac{1}{10}$–$2\frac{1}{2}$ mm.

Hab. Panama, Peña Blanca, above Tolé.

Found in plenty on flowers, on the savannas, in January, 1883. Smaller and much less robust than the Guatemalan *L. punctatulus*, the puncturing of the elytra not nearly so coarse, the marginal cilia longer and more conspicuous, the sexual differences less marked. Abraded examples appear to be more shining than those with the fine vestiture intact. The colour varies from brassy to green. The Guatemalan *L. versicolor*, Gorh., is an allied larger form, with much broader elytra in the female, etc.

11. *Listrus aeneus.*

Listrus aeneus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 125.

The type of this insect, labelled by the author, is a female from Panima, Guatemala; the second example, from Oaxaca, Mexico, was retained by him, and we may be permitted to doubt whether it really belonged to the same species. *L. aeneus* (♀) is an elongate-oval, bright brassy insect, not unlike the type (♀) of *L. corallipes*; but it is larger and longer, with a longer, smoother, subquadrate prothorax, stouter antennae, etc. The fifth antennal joint is triangular, and larger than the sixth or eighth, and the ninth and tenth are stout and transverse.

12. *Listrus corallipes.*

Listrus corallipes, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 127 (part.).

Hab. Guatemala, Vera Paz.

Two totally different species were placed under this name by Gorham: the type, from Guatemala, is a *Listrus*; the other specimen, from Toxpam, Mexico, has a slender fifth tarsal joint, simple, very slender claws, a stout, oblong apical joint to the antennae, etc., and, therefore, belongs elsewhere (cf. under *Mecomycter*, infra). The type of *L. corallipes*, from San Joaquin, is smaller than *L. punctatulus*, and has shorter antennae (which otherwise are similarly formed), a relatively smaller, subcampanulate prothorax, and red antennae (the basal and apical joints

excepted) and legs. Another female, from San Gerónimo, with darker legs and antennae probably belongs here.

13. *Listrus aeratus*, n. sp.

♀. Elongate, widened posteriorly, feebly convex, shining; of a bright brassy or greenish tint, joints 2–4 of the antennae, and the legs (the tips of the tarsi excepted), rufo-testaceous, for the rest infuscate; finely cinereo-pubescent, the marginal cilia of the elytra rather long. Head comparatively small, finely punctulate; antennae very short, widened outwards, joints 5–10 serrate, 5 triangular, larger than 6, 6–10 transverse, 9 and 10 broader than 8, 11 short-ovate. Prothorax transverse, convex, obliquely narrowed from about the middle forwards, the hind angles distinct; closely, minutely punctate. Elytra considerably wider than the prothorax, narrowing from a little beyond the middle, somewhat acuminate at the tip; closely and somewhat coarsely punctate in their basal third, the puncturing thence to the apex much finer and more diffuse.

Length $2\frac{1}{4}$–$2\frac{4}{5}$ mm.

Hab. Mexico, Orizaba (*F. D. Godman and H. H. Smith*).

Four specimens, apparently all females. Less convex than *L. crenicollis*, the prothorax shorter and flatter, and much more finely crenulate along the sides. From *L. corallipes*, Gorh., it may be known by its more elongate, less convex form, subacuminate elytra, more shining surface, etc.

14. *Listrus semiopacus*, n. sp.

♂. Narrow, subcylindrical, somewhat convex, moderately elongate, the head and prothorax dull, the elytra shining; black, with a slight aeneous lustre, the second joint of the antennae, and the tibiae and tarsi (except at the tips), rufescent; finely pubescent. Head broad, and except along the smooth raised central portion of the epistoma, opaque, densely, rugulosely punctate; antennae short, joints 5–10 strongly transverse, 5 a little broader than 6, and 9 and 10 slightly wider than 8, 11 ovate. Prothorax transverse, broad, rounded at the sides posteriorly, obliquely, narrowed in front; densely, rugulosely punctate, with an indication of a short smooth median line. Elytra subparallel in their basal half, very little wider than the prothorax, conjointly rounded at the apex; densely, finely punctate, the puncturing becoming a little coarser at the base. Intermediate tibiae with a stout blunt tooth at the inner apical angle.

♀. Head and prothorax a little narrower, the latter less rounded at the sides posteriorly.

Length $1\frac{9}{10}$–$2\frac{1}{10}$ mm. (♂ ♀.)

Hab. Mexico, Orizaba (*F. D. Godman and H. H. Smith*).

Two males and one female. An isolated form, recognisable by its small size, the opaque head and prothorax, the red tibiae and tarsi, the subparallel elytra, etc. It is more elongate than *L. pygmaeus* and *L. metallicus*.

15. *Listrus metallicus.*

Listrus metallicus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 127.

Hab. Guatemala, Cerro Zunil, Pacific slope.

A comparatively short, minute, brassy or golden insect, with fine, scattered yellowish pubescence, and rather coarsely punctate surface, the femora and tibiae more or less infuscate. The fifth antennal joint is, as usual, larger than the sixth, and the ninth and tenth joints are widened and transverse. The types are evidently male and female.

16. *Listrus pygmaeus.*

Listrus pygmaeus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 329.

Hab. Panama, Peña Blanca and Tolé.

Smaller than *L. metallicus*, nigro-violaceous or nigro-aeneous in colour, the puncturing much finer, the pubescence very fine, the fifth antennal joint small. The antennal joints 6–10 are transverse, 9 and 10 are wider than those preceding, 5 not larger than 6. The legs are described as rufous, but this is not quite correct, as they are partly or wholly infuscate in the long series before me.

Dasytellus.

Dasytellus, Casey, Ann. N. York Acad. Sci. viii, pp. 459, 564 (1895).

The few described species of this genus inhabit the arid regions of the South-Western States of N. America. *Listrus impressus*, Gorh., belongs to it. They are minute insects related to *Listrus*, from which they differ in having an impressed submarginal line on each side of the prothorax.

1. *Dasytellus impressus.*

Listrus impressus, Gorh., Biol. Centr.-Am., Coleopt., iii, 2, p. 329 (1886).
Dasytellus subovalis, Casey, loc. cit. pp. 565, 570 (1895).

Hab. United States, Arizona and Texas; N. Mexico, Sonora.

The six specimens before me from Sonora include both sexes, the males being narrower than the females and having the fifth ventral segment subtruncate at the tip. The above synonymy has been noticed by Casey (op. cit. ix, p. 682).

Dasytes.

Dasytes, Paykull, Faun. Suec. ii, p. 156 (1798); Gorham, Biol. Centr.-Am., Coleopt. iii, 2, p. 326 (1886); Casey, Ann. N. York Acad. Sci. viii, pp. 459, 571 (1895).

Casey restricts *Dasytes*, so far as the N.-American forms are concerned, to those species of " Dasytini " which have the anterior tibiae slender and devoid of spinules, the ungual appendages equal, but very short or rudimentary, and the pronotum with a roughly sculptured and abruptly limited marginal area. He enumerated 14 species nearly all of which are confined to the Pacific Coast region. The more widely distributed *D. hudsonicus*, Lec., extends southward to Colorado, Arizona, and Sonora, whence Gorham has recorded it on the strength of numerous specimens sent by Morrison.

Mecomycter.

Mecomycter, Horn, Trans. Am. Ent. Soc. x, p. 125 (1882); Casey, Ann. N. York Acad. Sci. viii, pp. 459, 595 (1895).

This genus was based upon a single species, from Kansas, with extremely slender, simple, tarsal claws and an elongate head, Casey subsequently adding a second (the type of which was without a head), which he supposed to be from Arizona. A Mexican insect with simple slender claws, included by Gorham under his *Listrus corallipes*, must be closely allied to *M. facetus*, Casey, differing from *M. omalinus*, Horn, in having a short head, clavate antennae, etc.

1. *Mecomycter testaceipes*, n. sp.

Listrus corallipes, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 127 (part.).

Moderately elongate, the head and prothorax dull, the elytra moderately shining; nigro-piceous, joints 1–6 of the antennae and the legs rufo-testaceous; clothed with an extremely fine adpressed pubescence (giving a pruinose appearance to the surface), the marginal cilia wanting. Head about as long as broad, bi-impressed in front, densely, finely punctate, the epistoma somewhat produced, transverse; antennae short, much widened outwards, joints 3–6 slender, 7–10 strongly transverse, 7 and 8 equal, much wider than 6, 9 and 10 broader than 8, stout, 11 oblong-ovate, nearly as wide as 10, longer than 9 and 10 united. Prothorax, narrow, transverse, convex, laterally compressed, subconical, with a small angular projection on each side towards the base, the marginal carina inferior, the hind angles distinct; densely, finely, uniformly punctate. Elytra, very much wider than the prothorax, oblong, rather depressed, subparallel at the base, less than twice as long as wide, incompletely covering the abdomen, with prominent tumid humeri; rather sparsely, minutely punctate and transversely rugulose. Legs slender; tibiae with a few extremely minute spinules on their outer edge; fifth tarsal joint cylindrical, the claws extremely slender, simple.

Length $2\frac{1}{2}$, breadth $1\frac{1}{6}$ mm.

Hab. Mexico, Toxpam (*Sallé*).

One specimen, probably a male, differing from *M. facetus*, Casey, to judge from the description, in having the prothorax and elytra much more finely punctured, the body uniformly piceous, the vestiture very fine and wholly decumbent, etc.

Subfam. *MELYRINAE.*

Melyrodes.

Melyrodes, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 128 (1882), 331 (1886).

Alymeris, Casey, Ann. N. York Acad. Sci. viii, p. 600 (1895).

A genus including a few species from North and Central America, two being now added from the last-named region. The synonymy has already been noted by Casey (op. cit. ix, p. 682).

3. *Melyrodes serricauda*, n. sp.

Elongate, narrow, the head and prothorax opaque, the elytra feebly shining; nigro-piceous, the elytra dark brown, the antennal joints 1–4 (except the upper side of 1), the extreme base of the tibiae, and the tarsi testaceous; clothed with very fine, short, decumbent, fuscous pubescence. Head densely, shallowly, rugosely punctate; antennae short, joints 3 and 4 very small, 5–10 strongly transverse, about equal in width, 5–7 triangular, 8–10 shorter, 11 ovate, narrower than 10. Prothorax strongly transverse, rounded at the sides posteriorly, narrowed in front, the anterior margin reflexed, the hind angles distinct, the lateral margins closely crenulate or serrulate; densely, shallowly, rugosely punctate. Elytra long, a little wider than the prothorax, subparallel or gradually widened posteriorly; very coarsely, densely, subseriately, punctate, and distinctly bi- or tricostate, the suture also raised; the explanate epipleural margin becoming wider at the apex and dehiscent at the sutural angle, its inner inferior margin sharply and closely serrate from about the apical third to the suture, the teeth at the apex projecting beyond the upper (outer) epipleural margin, the apex itself rather narrow.

Length 2 mm.

Hab. Panama, Tolé (*Champion*).

Two specimens, found on flowers on the open savanna, in January, 1883. Gorham, apparently, by some oversight, included these examples under his *M. perforata*, though he labelled one of them *M. crenata*. The form of the apex of the elytra is suggestive of that of various Hispidae. In one example there is a well-defined submarginal ridge on the elytra, in addition to the two others on the disc. The Guatemalan *M. crenata* has the antennal joints 5–10 much less transverse, and the elytra broader, less explanate and almost conjointly rounded at the apex, and the costae wholly wanting; *M. perforata*, from San Lorenzo, Panama, has the elytra shining, still more coarsely, confusedly punctate, without trace of costae (the stout sutural ridge excepted), and the inner inferior epipleural margin non-serrate. *M. cupripennis*, Pic, has brilliant cupreous elytra.

4. *Melyrodes cupripennis.*

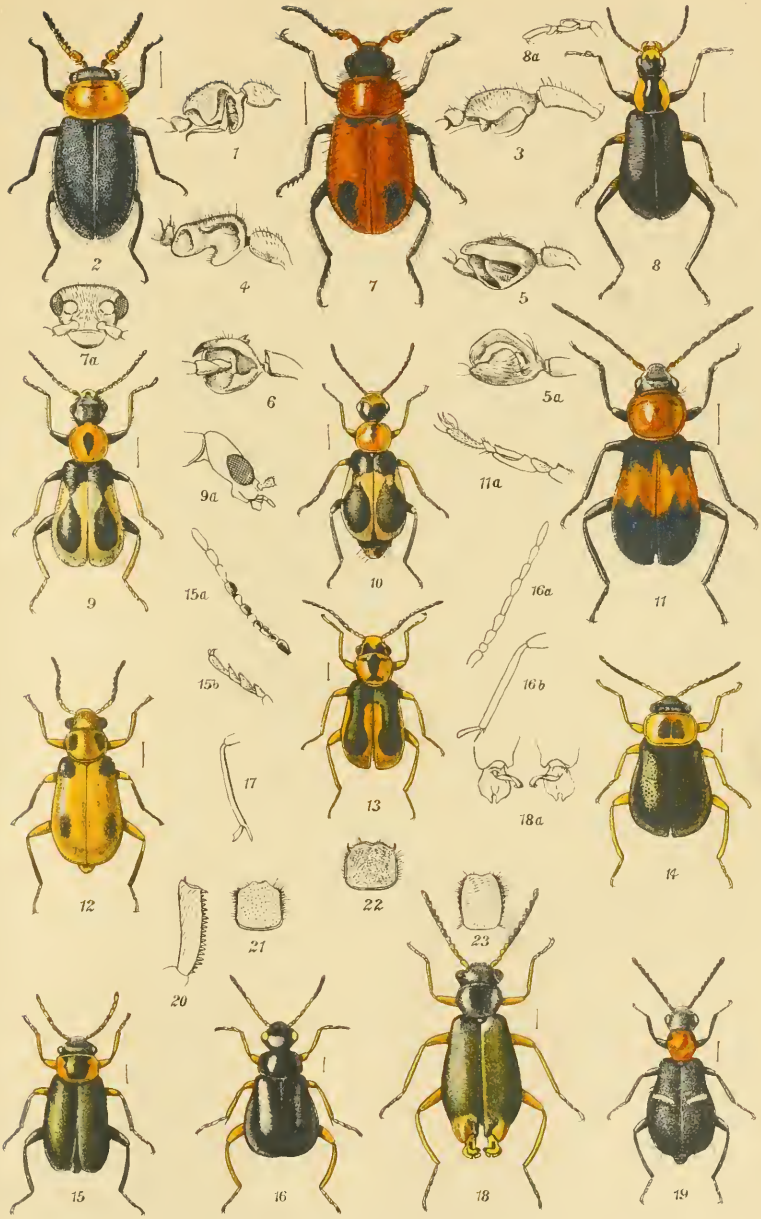
Melyrodes cupripennis, Pic, Le Naturaliste, 1898, p. 273.

" Peu allongé, à peine pubescent, noir presque mat sur la tête et

Explanation of Plate II.

Fig. 1. *Collops paradoxus*, n. sp., ♂: basal joints of antenna.
2. ,, *brevicollis*, n. sp., ♂.
3. ,, *illustris*, n. sp., ♂: basal joints of antenna.
4. ,, *4-maculatus*, F., ♂: ,, ,, ,,
5. ,, *histrionicus*, n. sp., ♂: ,, ,, ,,
5*a*, ditto, from in front.
6. ,, *blandus*, Er., ♂: ,, ,, ,,
7. ,, *conspicillatus*, n. sp., ♂: 7*a*, head from in front.
8. *Attalus nitidiceps*, n. sp., ♂.
9. ,, *connexus*, n. sp., ♂: 9*a*, profile of head.
10. ,, *ovaticeps*, n. sp., ♀.
11. ,, *forticornis*, n. sp., ♂: 11*a*, anterior tarsus, in profile.
12. ,, *sexguttatus*, n. sp., ♀.
13. ,, *viridivittatus*, n. sp., ♂ *.
14. ,, *flavomarginatus*, n. sp., ♀.
15. *Micromimetes discimacula*, Gorh., ♂: 15*a*, antenna; 15*b*, anterior tarsus in profile.
16. *Pseudattalus minimus*, Er., ♂: 16*a*, antenna; 16*b*, intermediate tibia.
17. ,, *armatus*, n. sp., ♀: posterior tibia.
18. *Pseudebaeus pusillus*, Lec., ♂: 18*a*, apices of elytra from in front.
19. *Sphinginus* (?) *eburatus*, n. sp., ♀.
20. *Holomallus serripes*, n. sp., ♂: anterior tibia.
21. *Trichochrous denticulatus*, n. sp., ♂: prothorax.
22. ,, *hamatus*, n. sp., ♂: ,,
23. ,, *crenulatus*, n. sp., ♂: ,,

* The anterior tarsi are incorrectly drawn in this figure, and really represent those of a ♀.



American Malachiidae and Melyridae

le prothorax, brillant métallique cuivreux foncé sur les élytres avec les parties antérieures de la tête, les antennes et pattes un peu roussâtres. Tête forte, presque aussi large que le devant du prothorax, densément ponctuée. Prothorax court, diminué en avant, dilaté et un peu arrondi en arrière, relevé sur les côtés qui sont crénelés, à ponctuation dense. Ecusson noirâtre. Élytres subparallèles puis atténués à l'extrémité, nettement explanés, ornés d'une ponctuation très forte, assez régulière avec seulement deux rudiments de côtes très faibles; suture élevée, angle sutural en pointe. Dessous du corps foncé, brillant. Pattes roussâtres avec les cuisses un peu épaissies. Long. $2\frac{1}{2}$ mill."

Hab. Costa Rica, San José.

"Diffère des *M. crenata* et *perforata*, Gorham, au moins par les elytres métalliques."

Explanation of Plate II.

[*See Explanation facing the* Plate.]

III. *Revision of the Mexican and Central American* Chauliognathinae (*Fam.* Telephoridae), *based on the genital armature of the males.* By George Charles Champion, F.Z.S.

[Read March 4th, 1914.]

Plates III—VIII.

Since the conclusion of the Rev. H. S. Gorham's work on the Mexican and Central American *Chauliognathinae*, in 1885, a great deal of additional material has accumulated, necessitating a complete revision of the numerous forms described by him. For this purpose the aedeagus of the male of each species has been examined, and figured, good differential characters having been found to be present in the genital armature. As might be expected, far too much importance has been attached to colour by nearly all writers on the subject, and the real structural characters, in consequence, overlooked. About a dozen so-called species are here sunk as synonyms or varieties, but the deficiency is nearly made up by the forms now added, bringing the number to 40, one (*Chauliognathus morio*, Gorh.) having to be erased as not belonging to the region. No attempt, it may be observed, seems to have been made since Leconte's time to revise the N.-American *Chauliognathini*, two more of which (*C. marginatus*, F., and *C. discus*, Lec.) are here added to the Mexican list. The group, or subfamily, may be characterised thus :—mentum elongate; gular sutures confluent; tarsal claws simple; dorsal segments 1–7 of the abdomen each with a circular pit at the outer apical angle of the reflexed lateral margin, 8 simple; aedeagus of ♂ with a very stout twisted median lobe, and asymmetric rigid lateral lobes (one of which is sometimes wanting), covered by an oval convex cap, which (as seen from the ventral aspect) is more or less emarginate on the left side, the last ventral segment broadly cleft down the middle for its reception. The subfamily *Chauliognathinae* as thus defined includes *Chauliognathus*, Hentz (type *Telephorus pennsylvanicus*, De Geer), *Xenismus*, Waterhouse (type *X. nigroplagiatus*,

from Ecuador, the male of which is unknown), and *Daiphron*, Gorham (type *D. lyciforme*), and so far as at present known is mainly confined to the New World, a few species from New Guinea, Australia, and Lord Howe Island excepted.

The Lyciform Tropical American insects placed by Gorham under *Daiphron* mimic some of the Lycids of the same regions; but in one of them the mimicry is confined to certain varieties of the female only. Then again, amongst the *Chauliognathi*, with which *D. proteum* must be placed, there are forms mimicking, in one (*C. corvinus*) or both (*C. morio*) sexes, various Lampyrids of the genera *Photinus*. These divergences from the Chauliognathid type (which are even better illustrated, as regards the Lampyriform facies, in *Discodon*, of the subfamily *Telephorinae*), in one or both sexes, are of particular interest, considering the abundance of the feeble sluggish Lycids and Lampyrids in the same country; the predatory *Chauliognathinae*, however, to judge from the special glands along the margins of their abdomen, may be equally distasteful to certain enemies. *C. procerus*, Bourg., from New Guinea, and the Australian species, including *Telephorus pulchellus*, MacLeay, referred to *Chauliognathus* by Bourgeois,* as well as the allied *T. apterus*, Olliff, from Lord Howe Island, differ from the American forms in having the median lobe of the aedeagus much less twisted and the asymmetric lateral lobes peculiarly shaped, the left lobe (as seen directed forwards) being greatly developed in *C. procerus*, etc. The general structure of the aedeagus, therefore, indicates that the Australian and New Guinea insects (seven species of which have been dissected) should be treated as generically distinct from *Chauliognathus*. The circular pit at the outer apical angle of each dorsal abdominal segment (not to be confused with the transverse spiracles, which are placed near the inner edge of the reflexed portion of the same segment, or on the membranous space connecting the two surfaces) is the outlet of a secretory gland, from which a liquid or offensive odour is doubtless emitted by the insect in life. In certain American genera of *Telephorinae* with greatly abbreviated

* Bull. Soc. Ent. Fr. 1910, p. 126. Females only were known of the two New Guinea insects described by him. Additional species from that Island have since been described by Pic (*op. cit.*, 1911, pp. 197–199).

elytra, *Maronius* and *Belotus*, the walls of this pit are drawn out into long oblique tubular processes, and in *Maronius* the aedeagus is asymmetric, and covered by a convex cap; but these genera differ from the *Chauliognathinae* in the form of the terminal abdominal segment, etc.

The aedeagus* of the males of the *Chauliognathinae* is very different in structure from that of the *Telephorinae*, and owing to the twisted median lobe and the asymmetric lateral lobes copulation must of necessity be lateral. The very stout median lobe and the tegmen appear to be soldered together, but the basal portion of the former is membranous (figs. 1, 9*a*, 22*a*), allowing a certain amount of movement when coition takes place. The left lateral lobe (as seen dissected and directed forwards) is usually longer than, and always differently shaped from, the right lobe, the latter being occasionally wanting (*C. tripartitus*, etc.); and its apex together with that of the spoon-shaped terminal portion of the median lobe forms a pair of claspers for grasping the female during the prolonged copulation. The median orifice is on the distal aspect of the main central lobe, and the more or less evaginated soft internal sac is frequently visible in dried specimens. The immovable lateral lobes vary in structure according to the species, and one or the other of them is sometimes bi- or trifurcate at the tip. When the form of these lobes, which can be seen by lifting the aedeagal cap (= last ventral segment of Leconte and the valvular plate of Gorham), is taken into consideration, it affords in many cases a ready means of discrimination between closely allied species. Figures of these structures are appended to the present paper (Plates IV—VIII), that of *C. procerus* (figs. 44, 44*a*) being added for comparison with the American forms.† They are taken, and described, from the dissected aedeagus mounted on its ventral surface, with the lobes directed forwards and thus reversed. This is actually the dorsal aspect of the organ, the convex ventral portion, on which aspect the median lobe is membranous at the base, fitting into the concavity of the oval, convex, aedeagal cap.

* *Cf.* Sharp and Muir, Trans. Ent. Soc. Lond. 1912, pp. 481, 484, 485.

† *Cf.* Sharp and Muir's figure 139, showing the aedeagus of an unnamed *Chauliognathus?* from New Guinea.

Daiphron.

Daiphron, sect. I, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 66 (1881), 277 (1885).

This genus, type *D. lyciforme*, is provisionally retained for the species with the elytra greatly widened posteriorly in both sexes, the head feebly developed, and the antennal joints 3–11 more or less widened or serrate. The male of *D. proteum*, Gorh., cannot possibly be separated generically from *Chauliognathus corvinus*, which has simple antennae in the male and dilated subserrate antennae in the female. *D. lyciforme* and *D. personatum*, again, have these organs formed very much as in *Chauliognathus sodalis*, so that the antennal structure alone cannot be used to distinguish *Daiphron* from *Chauliognathus*. In addition to the four Central American forms, there are various others from Tropical South America in the Fry collection at the British Museum and in the University Museum at Oxford. The former represent two sections :—

Antennae, ♂ ♀, very elongate, gradually tapering towards tip, joints 3–10 moderately widened or subserrate	*Species* 1, 2.
Antennae, ♂ ♀, much shorter, rapidly tapering towards tip, the intermediate joints greatly widened and serrate	*Species* 3, 4.

1. *Daiphron lyciforme.*

Daiphron lyciforme, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 66, pl. 5, fig. 2 (♀) (1881) (nec *C. lyciformis*, Bourgeois, 1887).

Hab. Mexico, Chinautla (*Sallé*); Guatemala, Alta Vera Paz; Nicaragua.

Var. *a*. Elytra, prothorax and scutellum ochreous.

Daiphron ochraceum, Gorh., loc. cit. pp. 67, 277 (excl. var.).
Hab. Guatemala, Alta Vera Paz; Costa Rica; Panama.

♂. Aedeagus: median lobe obliquely bent, emarginate on the upper edge before the apex, the apex itself produced into a long, spoon-shaped process; left lateral lobe long, feebly sinuate, narrowed to the tip, the latter straight; right lateral lobe stout, longer than the left, curved upwards from about the middle, and produced into a sharp slender tooth at the tip. Plate IV, figs. 1, 1*a*.

D. lyciforme and *D. ochraceum* simply differ in the colour of the upper surface, like many other *Chauliognathnae*, and they cannot be treated as distinct. A male of each has been dissected, and they prove to have the aedeagus precisely similar in structure. Twelve examples have been examined, and there are others from S. America in the British Museum that probably belong to the same species. The so-called variety of *D. ochraceum*, from Bugaba, noted by Gorham (loc. cit. p. 277), is a perfectly good species, and it has recently been named *D. lineatum* by Pic.

2. *Daiphron personatum*, n. sp. (Plate III, fig. 2, ♂.)

♂. Elongate, widening posteriorly, black, the prothorax (two sinuous mesially coalescent vittae on the disc excepted) and the elytra to beyond the middle (an oblong spot near the suture at the base excepted) reddish-ochraceous, the apical portion of the latter nigro-violaceous, the abdomen ochreous, with the aedeagal cap infuscate, the femora above and the tibiae in part fusco-testaceous. Head rather small, obliquely narrowed behind the eyes, the latter rather prominent; antennae long, tapering towards the tip, joints 4–10 moderately widened, 3 barely half the length of 4. Prothorax opaque, transverse, rounded at the sides and sinuate at the base, the angles completely effaced, the lateral and apical margins broadly, and the basal margin narrowly reflexed, the disc sulcate down the basal half and deeply excavate towards the sides. Elytra somewhat shining, at the base of about the same width as the prothorax, and widened from a little below the tumid humeri to near the apex, the apices broadly rounded; densely, rugulosely punctate, with two distinct dorsal costae and a similar raised line towards the outer margin.

♂. Aedeagus : median lobe long, strongly curved; left lateral lobe long, broad at the base, and then abruptly narrowed and arcuate to the tip, the latter slightly hooked; right lateral lobe much shorter than the left, compressed, bent outwards, and distinctly hooked at the tip. Plate IV, figs. 2, 2*a*.

Length (excl. head) 13½ mm.

Hab. Honduras (*Dyson, in Mus. Brit.*).

One male, received by the British Museum in 1845. A remarkably distinct form, separable at once from *D. lyciforme* by the strongly rounded sides of the prothorax, the rather shining, distinctly tricostate elytra, and the more slender antennae. The black mark on the disc of the prothorax is H-shaped.

3. *Daiphron lineatum.* (Plate III, fig. 1, ♂.)

Daiphron ochraceum, var., Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 277.

Daiphron ochraceum, var. *lineatum,* Pic, Mélanges exot.-entomologiques, fasc. iv, p. 6 (Sept. 1912).

Very like *D. lyciforme* var. *ochraceum,* Gorh., but much smaller; the prothorax with a narrow black median vitta (as in typical *D. lyciforme*); the antennae much shorter in both sexes, the intermediate joints greatly widened and more strongly serrate (as in *D. crassicorne*); the prothorax narrow, subparallel in ♂, subcampanulate in ♀, the margins narrowly reflexed.

Length (excl. head) 11½–12 mm. (♂ ♀.)

♂. Aedeagus: median lobe obliquely bent, simply sinuate on the upper edge towards the apex, the latter feebly produced; left lateral lobe very elongate, slender, almost straight, feebly hooked at the tip; right lateral lobe nearly as long as the left, compressed, rather broad, angularly dilated just beyond the middle, and with the apex sharply bifurcate, the inner angle produced into a strongly curved, acute hook. Plate IV, figs. 3, 3*a*.

Hab. Panama, Bugaba.

The above description has been taken from a pair in the "Biologia" collection, one or two others having now passed into the hands of M. Pic. The sharply bifurcate shorter right lateral lobe of the aedeagus is characteristic, separating *D. lineatum* at once from the same sex of *D. lyciforme.*

4. *Daiphron crassicorne.*

Daiphron crassicorne, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 67, pl. 5, fig. 24 (♀).

♂. Aedeagus: median lobe curved, feebly produced at the apex; left lateral lobe extremely elongate, slender, sinuate, narrowed at the tip; right lateral lobe short, compressed, obliquely bent, slightly hooked at the apex. Plate IV, fig. 4.

Hab. Guatemala, Zapote, Pacific slope.

Described by Gorham from a pair from Zapote. The great disparity in the length of the lateral lobes of the aedeagus brings this species near *Chauliognathus proteus.*

Chauliognathus.

Chauliognathus, Hentz, Trans. Am. Phil. Soc., new series,

iii, p. 460 (1830); Leconte, Trans. Am. Ent. Soc. ix, p. 43 (1881); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 68 (1881), 277 (1885).

Daiphron, sect. II, Gorh., loc. cit. p. 68.

Chauliognathus includes a large number of American forms, the species from New Guinea and Australia referred to it by Bourgeois and Pic probably requiring a separate genus for their reception. It is apparently replaced in the Antilles by *Tylocerus*. The forty species here enumerated (including *C. morio*, which is Brazilian) may be grouped thus :—

A. Species Telephoriform in ♂, Lyciform in some of its varieties in ♀; head large in ♂, small in ♀; antennae rather short, the intermediate joints broadly widened and subserrate in both sexes. [DAIPHRON, Gorh., part.] . . *Species* 1.

B. Species Telephoriform in ♂, Lampyriform (*Photinus* or *Photuris*) in ♀; antennae in ♂ subfiliform, gradually tapering towards tip, in ♀ shorter and with intermediate joints widened and subserrate . . . . . *Species* 2.

C. Species Lampyriform (*Photinus*) in both sexes; antennae, ♂ ♀, short, and with intermediate joints broadly widened and subserrate* . [*Species* 3.]

D. Species Telephoriform in both sexes [=CHAULIOGNATHUS, s. str.].

a. Elytra long, ample, subparallel or slightly rounded at sides, usually covering the abdomen.

*a*¹. Antennae very elongate, tapering towards tip, the intermediate joints much widened : species very large . . . . *Species* 4.

*b*¹. Antennae very elongate, slender, subfiliform, joints 9–11 widened in ♂; head and prothorax shining, the latter large; aedeagus of ♂ with one of the lateral lobes wanting : species large† . *Species* 5.

*c*¹. Antennae filiform or subfiliform in both sexes, sometimes narrowed towards the tip . . . . . *Species* 6–18.

* One or two other Brazilian forms belong to this section.

† *C. luctuosus* (Latr.) and some other S.-American forms belong to this section.

b. Elytra gradually narrowed posteriorly, lanciform or subulate, usually not quite covering the abdomen; antennae filiform or subfiliform, often longer in ♂ . . . *Species* 19–33.

c. Elytra somewhat abruptly subulate, usually covering the abdomen; antennae filiform or subfiliform . . . . . *Species* 34–38.

d. Elytra subulate, short, not nearly covering the abdomen in either sex; antennae filiform or subfiliform . . . . . *Species* 39, 40.

1. *Chauliognathus proteus.* (Plate III, figs. 3, ♂, 4, ♀.)

Daiphron proteum, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 68, 277, pl. 5, figs. 14, 15, 16; Pic, Mélanges exot.-entomologiques, fasc. vi, p. 9 (July, 1913).

♂. Aedeagus: median lobe obliquely bent; left lateral lobe very elongate, sinuate, acuminate and slightly hooked at the tip; right lateral lobe short, compressed, obliquely bent at about the middle, and produced into a rather long curved hook at the apex. Plate IV, figs. 5, 5*a*.

Hab. Mexico, from Durango southward; British Honduras; Guatemala; Costa Rica; Venezuela (*ex coll. Fry*).

An abundant insect in Central America, but not yet received from Nicaragua or Panama, and extremely variable in the colour and markings of the elytra, the prothorax, too, wanting the median vitta in some examples, similar variations in colour amongst certain *Chauliognathi* having been given specific rank by Gorham and others. The male has the subparallel general shape of a Telephorid and the female the facies of a Lycid, this being especially noticeable in the form of *Daiphron proteum* selected by Gorham as the type, *i. e.* the one with uniformly brick-red elytra, of which, to judge from the series before me, the male is rare and the female common. The male of the var. *nigripennis*, Pic, is extremely like the same sex of *Chauliognathus corvinus*, Gorh., and the two were found mixed in the "Biologia" collection. The following varieties, all noticed by Gorham, who selected the ochreous form as the type, have recently been named by Pic:—

1. Elytra black, with testaceous oblong humeral patch of variable extent (fig. 16 of Gorham) . . . . . *apicalis.*

2. Elytra black fasciated with testaceous, or testaceous fasciated with black (fig. 14 of Gorham) . . . . . *bifasciatus.*
3. Elytra testaceous maculated with black along the suture anteriorly . . . . . *inapicalis.*
4. Elytra testaceous, with a common anterior fascia and an isolated ante-apical mark black. . . . . *trimaculatus.*
5. Elytra entirely black . . . . . *nigripennis.*

These definitions scarcely include the common form with about the apical third of the elytra black, or the one (from Cuernavaca) with a broad transverse black patch on the disc below the base. A male of each form has been dissected, showing no variation in the structure of the aedeagus, and the accurate specific diagnosis of the author.

2. *Chauliognathus corvinus.* (Plate III, figs. 5, ♂, 6, ♀.)

♂. *Chauliognathus corvinus*, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 281.

♀. *Telephorus* (*Chauliognathus ?*) *haereticus*, Gorh., loc. cit. p. 289.

♂. Head large, broad; antennae moderately long, rather stout, slightly tapering towards the tip; prothorax subquadrate, usually with a very broad median vitta, and sometimes a small spot on each side of it, black; elytra rapidly narrowing posteriorly, varying from wholly black or fuscous to ochraceous with the tip more or less infuscate, rarely fuscous with the sutural and outer margins flavescent; legs usually black, rarely in part testaceous.

♀. Head small; antennae shorter, the intermediate joints broadly widened, rapidly tapering towards the tip; prothorax broader, transverse, more rounded at the sides, usually with a large subtriangular, dark patch on the disc; elytra broader, often dilated towards the middle, nigro-fuscous, fuscous, or fusco-testaceous, the sutural and outer margins often yellow; femora and tibiae testaceous, the tarsi infuscate.

♂. Aedeagus: median lobe obliquely bent; left lateral lobe extremely elongate, slender, bisinuate, feebly hooked at the tip; right lateral lobe very short, compressed, produced into a rather long, narrow, curved hook at the apex. Plate IV, figs. 6, 6*a*.

Hab. Guatemala, San Isidro; Nicaragua; Costa Rica; Panama.

A common insect in Chiriqui. There can be no doubt

as to the Lampyriform females being the sexual complement of *C. corvinus*, notwithstanding their different general facies. Gorham, moreover, had placed a similarly coloured pair from Chontales under his *C. haereticus ;* and amongst the males referred by him to the former there was one *Daiphron proteum* (from San Isidro), showing the close resemblance between one of the forms of that variable insect and typical *C. corvinus*, ♂. The antennae in the females are nearly as broad as in his *D. proteum*. A male from each country has been dissected; they have the very long left lateral lobe of the aedeagus more slender, and the median lobe less produced at the apex, than in the *Daiphron*. *Discodon chiriquense*, Pic, may be a female of this insect.

[3. *Chauliognathus morio*. (Plate III, fig. 7, ♂.)

Chauliognathus morio, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 77 (♀) (1881) (nec *Daiphron morio*, Kirsch, 1888).

♂. Aedeagus : median lobe very stout, curved, produced at the apex into a broad spoon-shaped process; left lateral lobe rather short, broad, compressed, convex at the base externally, concave within, subangularly dilated at a little beyond the middle, and feebly hooked at the apex; right lateral lobe longer than the left, tortuous, abruptly curved from about the basal third, and obliquely acuminate at the tip. Plate IV, figs. 7, 7*a*.

Hab. Brazil, Santa Catharina.

This species, the female only of which was known to Gorham, must be erased from the Central American list; it is an inhabitant of Brazil, as proved by the presence of a pair from Santa Catharina, and other allied forms from Brazil, in the Fry collection. The type (♀), from the Sturm collection, is labelled "? Mexico." *C. morio* bears an extraordinary resemblance to a large elongate *Photinus*, of the family Lampyridae, as stated by Gorham. The antennae in both sexes are rather short, and have the intermediate joints broadly widened and subserrate, tapering rapidly towards the tip. The three specimens before me (one male and two females) are similar in shape, nigro-fuscous in colour, with the margins of the prothorax and the sutural and outer edges of the elytra flavescent. The prothorax is transverse, narrowed anteriorly, deeply impressed down the middle behind, and with the margins broadly reflexed. A male from Brazil is figured.]

4. *Chauliognathus sodalis.*

Chauliognathus sodalis, Waterh., Trans. Ent. Soc. Lond. 1878, p. 326; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 69, pl. 5, figs. 8, 9 (♀).

♂. Aedeagus: apical portion of the median lobe very broadly and obliquely produced; lateral lobes stout, moderately long, the left lobe concave, broadly and obtusely dilated beyond the middle within, and with the short, curved, narrow apical portion hooked on the inner side at the tip, the right lobe shorter than the left, constricted on the dorsal aspect before the apex, the apex itself obtuse. Plate IV, figs. 8, 8*a*.

Hab. Mexico, Oaxaca.

There are three forms of this fine species: the form, selected as typical by its describer, with the elytra wholly ochreous (fig. 8 of Gorham); var. 1, with the apex of the elytra broadly black; var. 2, similarly coloured, except that the basally dilated black prothoracic median vitta is extended on to the base of the elytra (fig. 9 of Gorham). The antennae are long, dilated, compressed, and taper towards the tip, very much as in the type of the genus *Daiphron*, *D. lyciforme*. The narrow yellow "pygidial plate" mentioned by Gorham is, of course, peculiar to the female.

5. *Chauliognathus tripartitus.*

Chauliognathus tripartitus, Chevr., Col. Mex., Cent. ii, fasc. 5, no. 106; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 71, 278, pl. 5, fig. 4 (♂).

Hab. Mexico; Guatemala; Panama.

Var. *α*. Elytra with an ante-median fascia of variable width, rarely interrupted at the suture, yellow. (♂ ♀.) (Gorham's fig. 4.)

Chauliognathus janus, Waterh., Trans. Ent. Soc. Lond. 1878, p. 329 (♀); Gorh., loc. cit. p. 71.

Hab. Mexico; Guatemala; Panama; Ecuador.

Var. *β*. Elytra as in *α*, but with the apex yellow.

Chauliognathus tripartitus, Chevr., var., Waterh., loc. cit. p. 327.

Hab. Mexico; Guatemala.

Var. *γ*. Elytra wholly black. (♂.)

Hab. Mexico; Panama.

♂. Antennae very elongate, with the last three joints wider than those preceding.

♀. Antennal joints 3–11 narrow, equal in width.

♂. Aedeagus: median lobe short, very stout, slightly produced at the apex; left lateral lobe short, rather stout, hooked at the apex within; right lateral lobe altogether wanting. Plate V, figs. 9, 9*a*.

This species differs from all the other Central-American *Chauliognathi* in having the three apical joints of the antennae widened in the male, and in the complete absence of one of the lateral lobes of the aedeagus; the prothorax, too, is very shining and has the margins broadly reflexed. The colour of the elytra is variable, the yellow portion (extending over the basal half in the type of *C. tripartitus*) being sometimes absent. *C. luctuosus* (Latr.) is an allied form, with one of the lobes of the aedeagus also wanting.

6. *Chauliognathus heros.*

Telephorus heros, Guér., Rev. Zool. 1843, p. 18.
Chauliognathus heros, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 277 (♀).

Chauliognathus dimidiatus, Gorh., loc. cit. p. 69 (part.) (♂).

Hab. Costa Rica; Panama; Colombia; Ecuador; Peru.

Var. α. Elytra with about the apical third black.

Chauliognathus rex, Gorh., loc. cit. p. 68.

Hab. Mexico, Oaxaca; Guatemala, Vera Paz.

Var. β. Elytra narrowly margined with black at the apex.

Hab. Costa Rica, Volcan de Poas, alt. 2,000 metres (*Pittier, in Mus. Brit.*).

Var. γ. Elytra wholly ochreous or flavous.

Chauliognathus nitidicollis, Gorh., loc. cit. p. 69.

Hab. Costa Rica.

Var. δ. Elytra wholly black.

Chauliognathus heros, var., Waterh., Trans. Ent. Soc. Lond. 1878, p. 326.

Hab. Ecuador, Quito.

♂. Aedeagus: apical portion of the median lobe produced

into a long, spoon-shaped process; lateral lobes long, sinuous, the left lobe narrowing to the tip, the right lobe longer, broader, and more sinuate than the left, bifid at the apex, the inner produced apical portion acute and claw-like. Plate V, fig. 10.

The type of *C. heros* has the apical half of the elytra black, the black being a little less extended in the northern *C. rex* and altogether wanting in the var. γ (*nitidicollis*, Gorh.); var. β is intermediate between the latter. At Quito, Ecuador, as noted by Waterhouse, a form with uniformly black elytra occurs. The abdomen in the type is yellow, spotted with black along the sides; but the ventral segments, the last excepted, are often more or less nigro-fasciate in all the forms. The relatively broader prothorax of *C. heros*, mentioned by Gorham as a distinguishing character, is simply a female peculiarity. The prothorax itself is always ochreous, with a small, rounded, black central spot; and the surface is shining in some examples and opaque in others, possibly according to the maturity of the insect. One of the dark males before me from Ecuador has subparallel elytra. The structure of the aedeagus is precisely similar in the male of each form.

7. *Chauliognathus dimidiatus*.

Chauliognathus dimidiatus, Waterh., Trans. Ent. Soc. Lond. 1878, p. 330 (♀); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 69, pl. 5, fig. 3 (♂) (exclud. Costa Rican specimen) (*nec* Dej. Cat.).

Hab. Mexico, Vera Cruz; Nicaragua, Chontales.

Var. α. The elytra wholly black, the prothorax fuliginous, paler along the reflexed margins.

Hab. Ecuador, Paramba.

♂. Aedeagus: apical portion of the median lobe produced into a long, spoon-shaped process; left lateral lobe very elongate, feebly sinuate, and armed with a short tooth at the apex within; right lateral lobe shorter and more strongly sinuate than the left, angularly dilated before the apex, and armed with a stout hook on the dorsal aspect just before the bifid tip (the apex thus appearing trifid, when viewed from in front). Plate V, figs. 11, 11*a*.

This species has the entire upper surface duller than in *C. heros*, and the prothorax (which varies a good deal in shape, irrespective of sex) wants the central spot. The

abdomen is variable in colour. The Central American specimens (seven females and three males seen) are similarly coloured above; but in Ecuador an almost wholly black form is not uncommon. Of this dark variety there is a long series in the British Museum, found by Mr. Rosenberg, at Paramba, alt. 3,500 feet, in April, 1897, during the dry season. The male of this dark form has the aedeagus shaped exactly as in the three Nicaraguan specimens of the same sex of typical *C. dimidiatus*.

8. *Chauliognathus faustus.*

Chauliognathus faustus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 278, pl. 12, fig. 14 (♀).

♂. Aedeagus: apical portion of the median lobe produced into a long stout process; lateral lobes very elongate, subequal in length, the left lobe sinuate, blunt, and closely ciliate at the tip, and armed with a very minute tooth at the inner apical angle, the right lobe strongly sinuate, bowed inward at about the middle, and armed with a sharp claw towards the tip, the latter entire and somewhat pointed. Plate V, figs. 12, 12*a*.

Hab. Panama, Chiriqui.

This insect, at first sight, would appear to be nothing more than a form of *C. dimidiatus* (corresponding to the var. *nitidicollis* of *C. heros*) with entirely pale elytra and a rosy-red prothorax; but, as the lateral lobes of the aedeagus are differently shaped in the two males examined, *C. faustus* must be retained as a distinct species. The prothorax is transverse in both sexes (ten females and two males seen); but as it varies in shape in *C. heros*, no reliance could be placed on that character alone.

9. *Chauliognathus distinguendus.*

Chauliognathus distinguendus, Waterh., Trans. Ent. Soc. Lond. 1878, p. 328.

Chauliognathus tabulatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 70.

Hab. Guatemala; Nicaragua; Costa Rica.

Var. *a*. The elytra with the black discoidal subapical patch nearly reaching the outer margin, and coalescent anteriorly with the common scutellar mark, the outer limb to beyond the middle and the prothorax also (the large black patch on the disc excepted) sometimes rosy-red.

Chauliognathus tricolor, Gorh., loc. cit. p. 70, pl. 5, fig. 6 (♀).

Hab. Nicaragua; Costa Rica.

Var. β. Elytra black, with the outer limb narrowly or broadly to about the middle (the marginal stripes rarely connected by a narrow median fascia), and sometimes the apical margin also, flavous.

Chauliognathus jucundus, Gorh., loc. cit. p. 70, pl. 5, fig. 5 (♀).

Hab. Mexico, Ventanas in Durango (*Höge*); Guatemala, San Gerónimo and Cubulco in Baja Vera Paz.

Var. γ. Elytra with a large, common, subcordate or subquadrate patch at the base (extending outwards to the humeri), and a very broad subapical fascia, black.

Hab. Mexico, Acapulco and Chilpancingo in Guerrero (*Höge*, *H. H. Smith*).

Var. δ. Elytra as in γ, but with the broad subapical black patch extending to the apex.

Chauliognathus distinguendus, Gorh., loc. cit. p. 71 (*nec* Waterh.).

Hab. Mexico, Huanchinango (*Truqui*), Oaxaca.

♂. Aedeagus: median lobe long, stout, curved, the apical portion obliquely produced and narrowed towards the tip; lateral lobes sinuate, the left lobe long, concave, somewhat dilated on the ventral aspect towards the apex, curved inward at the tip, the tip itself truncate and armed on each side with a short hook, the right lobe much shorter than the left, compressed, curved outward, and obtuse at the tip. Plate V, fig. 13.

The numerous specimens from Durango, Guerrero, Vera Paz, etc., show all the gradations between *C. distinguendus* and the forms named by Gorham: *C. tabulatus* differs in no way from the type; *C. tricolor* is based on freshly emerged examples with the outer limb of the elytra rosy-red; *C. jucundus* included a series from Vera Paz with the black portion of the elytra more extended than in *C. tricolor*, a similar series from Durango only differing from it in having the apical margin narrowly yellow; the forms γ and δ have a broad ochreous or flavous median fascia extending upwards at the sides to the shoulder. The bihamate apex of the left lateral lobe of the ♂-aedeagus

(which is similarly shaped in all the forms) is characteristic of the present species. This character at once separates *C. distinguendus* from similarly coloured examples of *C. limbicollis*, which, moreover, is a much smaller insect.

10. *Chauliognathus profundus.*

Chauliognathus profundus, Lec., Proc. Acad. Phil. 1858, p. 71 (*nec* Crotch, Horn, Gorham).
Chauliognathus togatus, var., Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 278 (1885).
Chauliognathus ineptus, Horn, Trans. Am. Ent. Soc. xii, p. 150 (1885).

Var. *α*. Elytra with a common transverse fascia, or a spot on the disc of each, at about the apical third, or a transverse scutellar patch at the base, black; the three transversely placed black spots on the disc of the prothorax sometimes united into a large patch.

Chauliognathus togatus, var., Waterh., Trans. Ent. Soc. Lond. 1878, p. 327.
Chauliognathus togatus, Gorh., loc. cit. pp. 71, 278, pl. 5, figs. 10, 11.

Var. *β*. Elytra wholly rufo-fulvous.

Chauliognathus togatus, type, Waterh., loc. cit. p. 326; Gorh., loc. cit. pp. 71, 278.

♂. Aedeagus: median lobe large, strongly curved, produced at the apex into a very broad spoon-shaped process; left lateral lobe long, broad, concave, subangularly dilated on the dorsal aspect towards the tip, the latter feebly hooked; right lateral lobe much shorter and narrower than the left, compressed, obliquely bent outward from about the middle, the tip rounded. Plate VI, figs. 15, 15*a*.

Hab. North America, Arizona; Mexico, Sonora, Chihuahua, Durango, Guanajuato, Michoacan, Morelos, Guerrero, Oaxaca.

Two species, each with about the apical third of the elytra black, were confused by Leconte under the name *C. profundus*—one, the type, from Sonora, with the head black, the other, from Arizona [described in Trans. Am. Ent. Soc. ix, p. 43 (1881)], with the head red. The first-mentioned is not rare on the table-lands of Mexico, but the typical form of it is scarce, two examples only (from

Chihuahua and Guanajuato respectively) having been seen by me. Höge has sent a long series of the other forms from Tacambaro, Michoacan. The prothorax has three transversely placed spots, or a trapezoidal patch, on the disc in all of them. The femora are sometimes red at the base.

11. *Chauliognathus lecontei*, n. sp.

Chauliognathus profundus, Crotch, Trans. Am. Ent. Soc. v, p. 78; Lec., Trans. Am. Ent. Soc. ix, p. 43 (*nec* Proc. Acad. Phil. 1858, p. 71); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 278; Horn, Trans. Am. Ent. Soc. xii, p. 150.

Rufous, the palpi, two elongate streaks on the disc of the prothorax (sometimes reduced to two small spots or altogether wanting), the apex of the elytra broadly, the apex of the abdomen, and the legs (the base of the femora sometimes excepted) black, the antennae (as in *C. profundus*) usually with joints 3–11 in part testaceous, and for the rest black.

Length (excl. head) 12½–14 mm. (♂ ♀.)

♂. Aedeagus: median lobe stout, strongly curved, produced at the apex into a long spoon-shaped process; left lateral lobe long, abruptly angulate at about the middle, the basal portion oblong, spoon-shaped, the apical portion much narrower and strongly hooked at the tip; right lateral lobe much shorter than the left, compressed, obliquely bent outward from about the middle, the tip rounded. Plate V, figs. 14, 14*a*.

Hab. North America, Arizona; Mexico, Chihuahua.

The above description is taken from a long series sent by Höge from Chihuahua city and various examples received from Morrison as from Sonora. There is no variation in the colour of the elytra, but the two elongate streaks on the prothorax are sometimes reduced to small spots or are altogether wanting. *C. lecontei* is smaller and redder than *C. profundus*, the head is not black as in that species, and the abdomen (except the aedeagal cap of the male and the tip to a greater or less extent in the female) is almost wholly red. The aedeagus of the male does not differ greatly from that of its near ally. Mr. Wickham [Bull. Lab. Iowa, ii, p. 342, pl. 60, fig. 17 (1893)] has described the metamorphoses of the present insect at some length.

12. *Chauliognathus nigrocinctus.*

Chauliognathus nigrocinctus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 72, pl. 5, fig. 12 (♂).

Var. *α*. The common black post-median fascia of the elytra reduced to a rounded spot on the disc of each.

Chauliognathus distinguendus, var. ?, Waterh., Trans. Ent. Soc. Lond. 1878, p. 328.
Chauliognathus signatus, Gorh., loc. cit. p. 72 (♀).

Var. *β*. The black basal fascia of the elytra wanting, the post-median fascia reduced to a transverse streak on the disc of each; the prothorax immaculate; the head flavous at the sides in front. (♀.)

Chauliognathus bilineatus, var. 2, Gorh., loc. cit. p. 279.

♂. Aedeagus: median lobe moderately curved, the apical portion short; left lateral lobe very long, concave, compressed and dilated at the base, the long apical portion curved, hooked at the tip; right lateral lobe short, compressed at the base, and obliquely directed outward from about the middle. Plate VI, fig. 16.

Hab. Mexico, Chihuahua, Durango, Guanajuato, Jalisco, Guerrero, Oaxaca.

A common insect in Mexico and sent in abundance by Höge from Sayula in Jalisco and by H. H. Smith from Rincon in Guerrero. There is not the slightest ground for treating *C. nigrocinctus* and *C. signatus* as separate species. *C. nigrocinctus* is smaller and less elongate than *C. profundus* (= *togatus*, Waterh.), ochreous or flavous above, the black head excepted; the prothorax with from 2–5 transversely placed spots on the disc, which are often united into a transverse fascia; the elytra with a narrow complete basal fascia, and a transverse fascia of variable width beyond the middle, which is reduced to a rounded spot on the disc of each in the var. *signatus*, black; the legs, antennae, and abdomen in great part, black, the anterior tibiae sometimes testaceous along their inner edge. The differently shaped lateral lobes of the aedeagus separate *C. nigrocinctus* from all the varieties of *C. distinguendus*, which, moreover, never has a common narrow black basal fascia to the elytra. The var. *β* is represented by a single female from Pinos Altos in Chihuahua.

13. *Chauliognathus bilineatus.*

Chauliognathus bilineatus, Gorh., Biol. Centr.-Am., Coleopt.

iii, 2, pp. 72, 279, pl. 5, fig. 13 (♀) (exclud. the var. from Chihuahua).

Hab. Mexico, precise locality unknown.

Var. α. Elytra with the apical third black.

Chauliognathus bilineatus, var. 1, Gorh., loc. cit. p. 279, pl. 12, fig. 16 (♂).

Hab. Mexico, Coahuila and Nuevo Leon.

♂. Aedeagus: median lobe strongly curved, the apical portion produced; left lateral lobe short, sinuate, stout, widened at the base, narrowing outwards, hooked at the tip; right lateral lobe much shorter than the left, compressed, bowed outward from about the middle. Plate VI, fig. 17.

The type form described by Gorham is ochreous, the head transversely marked with black between the eyes and at the base, the prothorax with two long narrow black streaks on the disc, the elytra with or without a small black spot on the disc beyond the middle, the femora broadly testaceous at the base, the rest of the legs and the antennae black, the ventral segments sometimes spotted with black. The variety from Saltillo in Coahuila and Monterey in Nuevo Leon, with broad black apex to the elytra, and the prothorax bilineate or immaculate, comes near *C. lecontei*.

14. *Chauliognathus collaris*.

Chauliognathus collaris, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 76 (♂).

♂. Aedeagus: median lobe long, broad, obliquely bent, produced at the apex; left lateral lobe stout, concave, very abruptly bent from near the base, the long apical portion strongly curved, narrowing outwards, and hooked at the tip; right lateral lobe much shorter than the left, stout, compressed, pointed at the tip. Plate VI, figs. 18, 18*a*.

Hab. Mexico, Oaxaca (*Sallé*, *Boucard*).

Var. ? Elytra ochraceous, with a common transverse patch at the base black; the abdomen wholly black.

Hab. Mexico (*Mus. Oxon.*: ♀).

Described by Gorham from a single specimen incorrectly stated to be from Cordova. The type (♂) is labelled

" Oaxaca," and there are three females in the " Biologia " collection from the same source. *C. collaris* is larger than *C. aterrimus*, differing from the similarly coloured form of that species in having the prothorax rounded at the sides posteriorly, very shining, and nigro-bipunctate on the disc; the antennae extremely elongate, and the eyes more prominent, in the male; and the abdominal segments very narrowly bordered externally with yellow. The aedeagus is very similarly shaped in the two insects, that of *C. collaris* having a much longer median lobe and the longer lateral lobe more strongly curved from the abruptly twisted basal portion. The single (♀) specimen with pallid elytra (a transverse patch at the base excepted) seems to belong to the same species.

15. *Chauliognathus vestitus*, n. sp.

Black, the abdomen ochreous spotted with black; thickly, the head and prothorax sparsely, clothed with rather long cinereous pubescence, the elytra dull, the rest of the upper surface shining. Head in ♂ triangular and with large prominent eyes, smaller in ♀; antennae long, filiform, joint 3 a little more than half the length of 4. Prothorax subquadrate in ♂, broader and transverse in ♀, strongly rounded at the sides anteriorly and with rather prominent hind angles, the margins broadly reflexed, especially in ♀; the surface uneven, very shining, and almost smooth, the disc foveate in the middle towards the base. Elytra long, broader than the prothorax, gradually narrowed from about the basal fourth.

♂. Aedeagus: median lobe long, curved, produced into a spoon-shaped process at the apex; left lateral lobe extremely elongate, sinuate within, and produced at the apex into a long curved hook; right lateral lobe much shorter than the left, compressed, rounded at the apex. Plate VI, fig. 19.

Length (excl. head) 10–10½ mm. (♂ ♀.)

Hab. Mexico (*Mus. Oxon.*), Oaxaca (*Boucard*).

One pair, left undetermined by Gorham, and three others (♂ ♀) in the Oxford Museum. A wholly black form, the abdomen excepted, with a very shining, almost smooth prothorax, and rather coarse cinereous pubescence, which is sufficiently dense on the elytra to give them a grey appearance. The structure of the aedeagus, too, is characteristic. *C. vestitus* may be placed near *C. collaris*, the four known specimens of which were obtained by Boucard at the same locality.

16. *Chauliognathus aterrimus.*

Chauliognathus aterrimus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 76 (♂).

Var. *a*. Prothorax rufous or flavous, rarely with various coalescent marks on the disc, or two sinuous vittae and an oblong mark between them, or three small transversely placed spots, black.

Chauliognathus sp.? (no. 25*a*), Gorh., loc. cit. p. 282 (♀).

♂. Aedeagus: median lobe obliquely bent, produced into a rather long, broad, somewhat curved, spoon-shaped process at the apex; left lateral lobe moderately stout, concave, broad at the base, abruptly bowed before the middle, and with the longer apical portion curved and feebly hooked at the tip; right lateral lobe much shorter than the left, rather broad, compressed, pointed at the tip. Plate VI, figs. 20, 20*a*.

Hab. Mexico (*Truqui*), Puebla (*Sallé:* types), Cuernavaca in Morelos, Matamoros Izucar in Puebla (*Höge*), Venta de Zopilote in Guerrero (*H. H. Smith*).

The two insects seen by Gorham were both from Puebla, but he does not seem to have suspected their affinity, as the female with a red prothorax was compared by him with *C. collaris*, a very different insect. Amongst the series of twenty-five examples now available for examination, most of which are from Cuernavaca, five only have the prothorax black, and in one of these there are two small transverse red marks on the anterior part of the disc. This species has the entire upper surface opaque; the head rather small, the eyes somewhat prominent; the antennae long and slender in the male, shorter in the female; the prothorax subquadrate, with rather prominent hind angles and broadly reflexed margins; the body (the flavescent lateral margins of the abdomen excepted), antennae, and legs black, the prothorax often wholly, or in part, rufous. A male of each form has been dissected. The single example (♀) from Guerrero is larger and more elongate than the rest. In one of the two males in the Oxford Museum the prothorax is red, with various coalescent black markings on the disc, such as in *C. hieroglyphicus*.

17. *Chauliognathus exiguus.* (Plate III, fig. 8, ♂.)

Chauliognathus exiguus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 283.

♂. Aedeagus: median lobe very stout, abruptly curved, slightly produced at the apex; left lateral lobe very slender, long, sinuate, dilated at the base, feebly hooked at the tip; right lateral lobe short, compressed, slightly hooked at the tip. Plate VI, fig. 21.

Hab. Panama, Chiriqui; Colombia, Santa Marta (*Mus. Brit.*).

Described from three specimens, one, from Bugaba, having the prothorax immaculate, as in a Colombian example (♀) in the British Museum. The pair retained for the "Biologia" collection are very similar, the female simply being broader than the male, and the rather short, stout, filiform antennae do not reach the middle of the elytra in either sex, tapering a little towards the apex in the female. The elytra are parallel and have their sutural and outer margins flavous. The prothorax has two prominent callosities on the disc, separated by a deep groove. *C. exiguus* is one of the smallest known species of the genus.

18. *Chauliognathus limbicollis.* (Plate III, fig. 9, ♂, var. *scapularis.*)

Chauliognathus limbicollis, Lec., Proc. Acad. Phil. 1858 [1859], p. 71; Trans. Am. Ent. Soc. ix, p. 44; Crotch. Trans. Am. Ent. Soc. v, p. 78; Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 283.

Chauliognathus opacus, Lec., New Sp. N.-Am. Col. p. 90 (1865).

Chauliognathus hastatus, Gorh., loc. cit. p. 77, pl. 5, fig. 7 (♀).

Hab. North America, Southern United States; Mexico; Guatemala.

Var. *α*. Prothorax opaque, wholly black; elytra with the apical black space extending broadly forward along the suture to the base, and usually widening anteriorly, leaving the sides to beyond the middle to a greater or less extent, and the apical margin, yellow. (♂ ♀.)

Hab. Mexico (*Mus. Brit., ex coll. Pascoe*), Morelia in Michoacan (*Höge*).

Var. *β*. Prothorax shining, ochreous or rufo-testaceous, with two or three transversely placed spots on the disc, which are sometimes confluent, black; elytra black, with a humeral patch or stripe (sometimes reaching to about the middle), and the apical margin

rarely, ochreous; apices of the femora, the anterior and intermediate tibiae in great part, and the base of the posterior tibiae, testaceous. (♂ ♀.)

Chauliognathus scapularis, Gorh., loc. cit. p. 77 (♀).

Hab. Mexico (*ex coll. Sturm; Truqui*), Zapotlan in Colima, Chilpancingo in Guerrero (*Höge*).

♂. Aedeagus: median lobe long, obliquely bent; left lateral lobe long, broad and concave to about the middle, and then abruptly narrowed and arcuately bowed to the tip (the apical portion varying in length and breadth in the ten specimens dissected), the tip more or less hooked; right lateral lobe much shorter than the left, compressed, obliquely bent. Plate VI, figs. 22, 22*a*.

An abundant insect in Mexico and varying greatly in colour, *C. limbicollis* itself being probably yet another form of *C. pennsylvanicus*, De Geer; but amongst the very large number of specimens before me there are none from Mexico or Guatemala with the elytra marked as in typical examples of the latter, *i. e.* with an oblong subapical black spot or vitta on the disc. *C. scapularis* has been received from the same localities (Zapotlan and Chilpancingo) as *C. limbicollis* (the latter sometimes having the knees broadly testaceous), and cannot be separated from it. The variety *a*, with wholly black prothorax, is represented by a series of nine specimens from Morelia. Leconte's type of *C. limbicollis* has a triangular scutellar patch and the apex of the elytra broadly black (this form being not uncommon at Orizaba), the dark markings being usually broadly coalescent along the suture in the Central American material examined. The aedeagus varies in the development of the curved apical portion of the longer lobe, but the general structure is similar. The antennae of the male are very long, distinctly widened outwards, with the apical joint a little narrower than the preceding; but in one Mexican example of this sex (apparently belonging to the same species) they are slender throughout.

19. *Chauliognathus mundus*, n. sp.

Chauliognathus scutellaris, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 283 (*nec* Lec.) (the Mexican examples from the Sallé collection only).

Chauliognathus mundus, Chevr. in litt.

Opaque, black; the prothorax rufo-testaceous, sometimes with a transverse or M-shaped black mark on the disc; the elytra ochre-

ous, with a black discoidal vitta extending from a little below the base to near the tip, the base sometimes transversely fuscescent on either side of the scutellum; abdomen ochreous, the apical segment and aedeagal cap more or less infuscate; anterior and intermediate tibiae testaceous. Head moderately large, the eyes not prominent; antennae very elongate in ♂, shorter in ♀, tapering slightly at tip, joint 3 about half as long as 4. Prothorax large, broader than long, in ♀ almost as wide as the elytra, rounded at each angle, the margins rather broadly reflexed. Elytra subulate.

♂. Aedeagus: median lobe obliquely bent; left lateral lobe long, concave, angularly dilated at about the middle, the apical portion abruptly curved, acuminate, hooked at the tip; right lateral lobe much shorter than the left, twisted and angularly dilated inwards near the base, the apical portion curved and compressed, blunt at the tip. Plate VII, figs. 23, 23*a*.

Length (excl. head) 9½–10 mm. (♂ ♀.)

Hab. Mexico (*Mus. Brit.*), Orizaba in Vera Cruz (*Sallé*).

Three males and two females, apparently distinct from the similarly coloured northern *C. pennsylvanicus*, De Geer *; differing from it in the relatively larger prothorax (especially noticeable in ♀), and the more subulate elytra. From similarly coloured varieties of *C. scutellaris* the broader and more transverse prothorax will serve to distinguish *C. mundus*. The aedeagus exhibits the same general structure in all these nearly related forms.

20. *Chauliognathus scutellaris.*

Chauliognathus scutellaris, Lec., Proc. Acad. Phil. vi, p. 230 (1853); Trans. Am. Ent. Soc. ix, p. 44 (1881); Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 283 (part.).

Chauliognathus basalis, Lec., Col. of Kansas and E. New Mexico, p. 13; Trans. Am. Ent. Soc. ix, p. 44.

Chauliognathus lewisii, Crotch, Trans. Am. Ent. Soc. v, p. 78 (1874).

♂. Aedeagus: median lobe obliquely bent; left lateral lobe long, angularly dilated at about the middle, and abruptly and arcuately bowed thence to the apex, the basal portion stout, the apical portion much narrower and hooked at the tip; right lateral lobe about as long as the basal portion of the left lobe, compressed, and obliquely bent. Plate VII, fig. 24.

Hab. North America, Kansas, Texas, New Mexico, etc.; Mexico, Monclova in Coahuila (*Dr. Palmer*), Saltillo in

* The life history of this species has been fully described by Riley,

Coahuila, Villa Lerdo and San Isidro in Durango, Monterey in Nuevo Leon (*Höge*).

The series of fifty specimens (varying from $7\frac{1}{2}$–$10\frac{1}{2}$ mm. in length, exclusive of the head) sent by Höge from Northern Mexico connect the various forms of this species, which is separable from *C. limbicollis* by the more shining prothorax and base of the elytra; the anteriorly narrowed, less transverse prothorax (at least in ♂), and the more subulate elytra. The black patch on the prothorax varies in extent, and is sometimes wanting; and the elongate discoidal subapical streak on the elytra is often united to the triangular scutellar mark (the suture remaining yellow), the latter becoming gradually shorter and shorter (*C. lewisii*) as the streak extends forwards till at last they are united into a continuous stripe. Three males have been dissected, including one from Kansas, and the aedeagus proves to be formed very much as in *C. limbicollis* and *C. pennsylvanicus*. *C. vittatus*, Schaeffer, from Nogales, Arizona, must be very closely related to the present species.

21. *Chauliognathus discus*.

Chauliognathus discus, Lec., Proc. Acad. Phil. vi, p. 230 (1853); Trans. Am. Ent. Soc. ix, p. 44 (1881); Crotch, Trans. Am. Ent. Soc. v, p. 78.

? *Chauliognathus misellus*, Horn, Trans. Am. Ent. Soc. xii, p. 150 (1885).

Ochreous, the head between and behind the eyes, and sometimes along the middle anteriorly, the antennae, two or three transversely placed spots on the disc of the prothorax, often united into a common fascia or dilated into an M-shaped mark, a small transverse patch at the base of each elytron and a large spot on the disc at about one-third from the apex, black; the femora with the basal half or more testaceous and the rest of the legs black; beneath pale flavous, the metasternum and ventral segments nigro-fasciate in ♀, the aedeagal cap slightly infuscate in ♂. Head rather long, the eyes somewhat prominent; antennae slender, fully as long as the body and perceptibly thickened towards the apex in ♂ (joints 3–8 slender and 9–11 a little wider), shorter and filiform in ♀, joint 3 about half the length of 4 in ♂. Prothorax shining, broader than long, rounded-subquadrate, the margins broadly reflexed, the disc with an oblong sulciform impression in the middle. Elytra much wider than the prothorax, gradually narrowing posteriorly, rather coarsely punctate, and often obsoletely costate on the disc, shining at the base.

♂. Aedeagus: median lobe obliquely curved, produced at the apex; left lateral lobe stout, long, concave, compressed and subangularly dilated at about the middle, hooked at the tip; right lateral lobe much shorter than the left, compressed, somewhat spoon-shaped at the apex. Plate VII, figs. 25, 25*a*.

Length (excl. head) 9½–12 mm. (♂ ♀.)

Hab. North America, Texas, Arizona; Mexico (*Mus. Brit., ex coll. Fry*), Villa Lerdo in Durango (*Höge*).

The fifteen specimens from Durango from which the above description is taken vary in the development of the markings on the prothorax and in the size of the discoidal spot on each elytron; but they all have the base of the femora to a greater or less extent testaceous, whereas the N. American forms are said to have the legs black. This character, however, is scarcely of specific value, and in the absence of material from north of the Mexican frontier for comparison the Durango insect is best treated as a form of *C. discus*, of which *C. misellus* would appear to be a variety. Leconte first gave "Mexican boundary" as locality, later (and apparently from other specimens) substituting "Texas." Horn's *C. misellus* was from Arizona.

22. *Chauliognathus marginatus.*

Cantharis marginata, Fabr. Syst. Ent. p. 206.
Chauliognathus marginatus, Hentz, Trans. Am. Phil. Soc., n. ser., iii, p. 460; Lec., Proc. Acad. Phil. v, p. 388 (1851); Trans. Am. Ent. Soc. ix, p. 44; Crotch, Trans. Am. Ent. Soc. v, p. 78.
Cantharis ligata, Say, Journ. Acad. Phil. v, p. 166.
Chauliognathus hentzii, Lec., loc. cit.

♂. Aedeagus: median lobe obliquely bent; left lateral lobe extremely elongate, strongly sinuate, acuminate and hooked at the tip; right lateral lobe short, compressed, obliquely bent and hooked at the apex. Plate VII, fig. 26.

Hab. North America, New York to Florida; Mexico, Monterey in Nuevo Leon (*Höge*).

This common N.-American insect is now known to extend into Mexico. It has a broad V-shaped mark on the head, a broad median vitta on the prothorax, and a discoidal vitta on each elytron (sometimes reduced to an oblong subapical spot), black, the rest of the upper surface being testaceous

or rufo-testaceous; the femora are broadly testaceous at the base; the antennae are moderately long, tapering outwards in both sexes; and the prothorax is oblong subquadrate, with narrowly reflexed margins, the surface opaque. The allied *C. obscurus*, Schaeffer, from Nogales, Arizona, is stated to have a longer third antennal joint, and the elytra, except basal part of margin and anterior part of suture, black.

23. *Chauliognathus sulphureus.*

Chauliognathus sulphureus, Waterh., Trans. Ent. Soc. Lond. 1878, p. 331 (♀).

Chauliognathus pallidus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 73, 279 (*nec* Waterh.).

♂. Aedeagus: median lobe strongly bowed, the apical portion obliquely produced; left lateral lobe long, rather convex, feebly sinuate within, hooked at the tip; right lateral lobe much shorter than the left, compressed, the apical portion somewhat spoon-shaped. Plate VII, figs. 27, 27*a*.

Hab. Mexico, Vera Cruz; Guatemala; Nicaragua; Panama; Amazons.

The type of this insect is an immature discoloured female, from Nauta, in the Amazon valley; but there can be no doubt as to the identification of the species. *C. sulphureus* may be readily distinguished from *C. pallidus*, Waterh., by its larger size, the uniformly sulphur-yellow or ochreous upper and under surfaces, the black antennae and legs, and the dark wings; the somewhat attenuate elytra do not quite cover the abdomen or wings (this being especially noticeable in the female), the eyes are relatively smaller and less prominent in the male, and the lateral lobes of the aedeagus are very differently shaped.

24. *Chauliognathus pallidus.*

Chauliognathus pallidus, Waterh., Trans. Ent. Soc. Lond. 1878, p. 330 (♂) (*nec* Gorh.).

Chauliognathus oedemeroides, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 73, 279.

Chauliognathus fuscescens, Gorh., loc. cit. p. 73.

Hab. Mexico, Vera Cruz; British Honduras; Guatemala; Nicaragua; Costa Rica; Panama; Colombia (*Mus. Brit.*), etc.

Var. *a*. The base of the head, a patch on the disc of the prothorax, the elytra (the sutural, apical, and lateral margins excepted), the outer half of the femora, the antennae, tibiae, and tarsi infuscate. (♀.)

Hab. Mexico, Teapa.

♂. Aedeagus: median lobe stout, curved, moderately produced at the apex; left lateral lobe short, broad, compressed, subtruncate at the tip, and armed with a sharp tooth at the upper apical angle; right lateral lobe (fig. 28*a*) much longer than the left, the outer portion widened and oblique, the apex sharply hooked at the inner angle and toothed at the outer angle. Plate VII, figs. 28, 28*a*.

An immature-looking, elongate insect, testaceous in colour, with the antennae, knees, and tarsi, and sometimes the extreme base of the elytra also (*C. oedemeroides*), infuscate or black. The wings are slightly infuscate. The eyes are very large and prominent in the male, a little smaller in the female. The variety is represented by a single female from Teapa. A common insect in Central America, represented by 70 examples in the collections before me. Five males have been dissected, showing no variation in the form of the lateral lobes of the aedeagus: the tooth at the apex of the broadly expanded left lobe (not shown in the figure) can only be seen when the aedeagus is viewed in profile.

25. *Chauliognathus exsanguis*. (Plate III, fig. 10, ♂, var.)

Chauliognathus exsanguis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 74 (part.) (*nec* p. 279).

Opaque, testaceous, the antennae, the apices of the femora, the tibiae and tarsi, some markings at the base of the head, an oblong patch on the disc of the prothorax (sometimes divided down the middle, or altogether wanting), and rarely a posteriorly evanescent streak on the basal half of each elytron near the suture, more or less infuscate. Head faintly punctulate, in ♂ much narrowed behind and with very prominent eyes, smaller in ♀; antennae in ♂ reaching to a little beyond the middle of the elytra, shorter in ♀, joint 3 about twice as long as 2. Prothorax narrow, oblong, slightly sinuate at the sides posteriorly, broader in ♀, the margins feebly reflexed. Elytra incompletely covering the abdomen, narrowed posteriorly. Aedeagal cap of ♂ very elongate.

Var. *a*. The head between and behind the eyes, entirely or in

part, a broad median vitta or two streaks on the disc of the prothorax, the elytra (the inner, apical, and outer margins excepted), and the legs in great part, infuscate or black.

♂. Aedeagus: median lobe strongly curved, produced into a thin spoon-shaped lamella at the tip; left lateral lobe rather convex, very long, slender, sinuate, slightly hooked at the tip; right lateral lobe a little more than half the length of the left, curved and feebly hooked at the apex. Plate VII, fig. 29.

Length (excl. head) 5¼–9¼ mm. (♂ ♀.)

Hab. Mexico, Tuxtla (*Sallé*), Teapa (*H. H. Smith*); Guatemala, Lanquin [type], San Juan, and Panzos in Alta Vera Paz (*Champion*); Nicaragua, Chontales (*Belt*).

The pair labelled by Gorham as the types are immature and almost immaculate, and the name *exsanguis*, therefore, is misleading. A series from Teapa includes all the above-mentioned forms. The present species is very closely related to *C. lituratus* (= *emaciatus*), Gorh., from which it mainly differs in its more prominent eyes in both sexes, and the narrower body. The aedeagus is very similarly formed in the two species, and is different in structure from that of the other forms (one of which is also from Alta Vera Paz) included by Gorham under *C. exsanguis*. The single dark male from Panzos has stouter antennae, and the left lateral lobe of the aedeagus shorter and more sinuate, and it may therefore belong to yet another species? An immature pallid male from Chontales has the sides of the prothorax deeply sinuate. Eight males have been dissected, the figure of the aedeagus being taken from the Lanquin type.

26. *Chauliognathus decolor*, n. sp.

Chauliognathus exsanguis, and var., Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 279 (*nec* p. 74).

Pale testaceous, the antennae (except the basal joint in some examples) and a fine line along the base and outer margin of the elytra (wanting in immature specimens) fuscous, the elytra often becoming more or less infuscate to near the apex and with the tip yellowish (the variety described by Gorham), the eyes black; finely pubescent, shining, the elytra duller towards the apex. Head much narrowed behind, the eyes prominent; antennae very long and slender, nearly reaching the tip of the elytra in ♂, shorter in ♀, joint 3 nearly three times as long as 2. Prothorax narrow, longer than broad, wider in ♀, more or less sulcate down the middle and

with the margins moderately reflexed. Elytra long, incompletely covering the abdomen in ♀, somewhat attenuate posteriorly.

♂. Aedeagus : median lobe stout, curved, obliquely cut off at tip; left lateral lobe long, slender, abruptly and arcuately twisted from about the middle, and blunt at the apex; right lateral lobe broader than the left, compressed, moderately long, armed with a rather long, curved, ciliate, tooth-like prominence at the base, and feebly bidentate at tip. Plate VII, fig. 30.

Length (excl. head) 6½–10 mm. (♂ ♀.)

Hab. Panama, Bugaba, Tolé, Los Remedios (*Champion*).

Seven females and two males, the latter immature. This is the insect referred by Gorham in his " Supplement " to *C. exsanguis*, under which he originally included two Guatemalan forms. The present species is closely related to *C. submarginatus* (the male having a very similarly formed aedeagus), from which it may be distinguished by the longer second antennal joint, the immaculate shining prothorax, etc. The antennae are longer than in *C. exsanguis*.

27. *Chauliognathus evanidus*, n. sp.

Chauliognathus exsanguis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 74 (part.) (*nec* p. 279).

Opaque, testaceous, the antennae, and in one specimen the knees and tarsi also, infuscate. Head much narrowed behind, the eyes large and prominent; antennae very long and slender, joint 3 about three times the length of 2. Prothorax rounded-subquadrate, narrower in ♂ than in ♀. Elytra elongate, nearly covering the abdomen.

♂. Aedeagus : median lobe very stout, not produced at the apex; left lateral lobe moderately long, compressed, blunt at the tip, with a strongly curved, long, stout hook abruptly projecting from the inner edge at some distance before the apex; right lateral lobe* about as long as the left, broad at the base, the longer apical portion becoming abruptly narrower and compressed, feebly bidentate at the tip. Plate VII, fig. 31.

Length (excl. head) 8–10½ mm. (♂ ♀.)

Hab. Guatemala, Panima [♂], Panzos [♀] (*Champion*).

One pair. This insect is very like *C. decolor*, but has longer elytra, a broader head and prothorax (especially noticeable in ♂), and a differently formed aedeagus, the left lateral lobe bearing a twisted, projecting, hook-like

* Accidentally broken off after the description was written.

process towards the tip. This last-mentioned structure separates *C. evanidus* from *C. exsanguis*, etc.

28. *Chauliognathus lituratus.*

Chauliognathus lituratus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 74, 280.

Hab. Mexico, Vera Cruz, Oaxaca; Guatemala; Nicaragua; Panama.

Var. α. The black horseshoe-shaped patch on the disc of the prothorax more extended; the elytra testaceous or fuscescent. (♂♀.)

Chauliognathus emaciatus, Gorh., loc. cit. p. 75, pl. 5, fig. 17 (♀).

Hab. Guatemala.

Var. β. The elytra almost entirely infuscate, the prothoracic marking obsolete. (♀.)

Hab. Mexico, Tabasco; Guatemala.

Var. γ. The head rufescent or testaceous, nigro-bivittate at the base; the prothorax with an oblong black patch on the disc; the elytra pale. (♀.)

Hab. Mexico, Jalapa.

♂. Aedeagus: median lobe long, obliquely bent, spoon-shaped at the tip; left lateral lobe extremely elongate, more or less sinuate, feebly hooked at the apex; right lateral lobe one-half or one-third shorter than the left, twisted, compressed, distinctly hooked at the tip. Plate VIII, figs. 33, 33*a*.

A very variable insect, and not uncommon in Southern Mexico and Guatemala. In the form described by Gorham as *C. lituratus* the elytra, which do not completely cover the abdomen, are testaceous or yellow, and often have the whole of the disc (the sutural and lateral margins excepted) infuscate, and the prothorax has a horseshoe-shaped black patch (sometimes divided into two spots) on the disc. The head usually has the basal half almost entirely black; it is gradually narrowed behind, and is large and elongate in the male, but the eyes are not prominent in either sex. Four males have been dissected, showing little variation. The structure of aedeagus is extremely like that of *C. exsanguis*.

29. *Chauliognathus pardalinus.* (Plate III, fig. 11, ♂.)

Chauliognathus pardalinus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 280.

♂. Aedeagus : median lobe obliquely bent, produced into a spoon-like process at the apex; left lateral lobe extremely elongate, slender, sinuate, slightly hooked at the tip; right lateral lobe about one-third shorter than the left, curved and acuminate at the apex. Plate VII, fig. 32.

Hab. Panama, Bugaba.

Gorham's description of this species was taken from the unique male, which has an enormously developed, elongate head and abbreviated lanciform elytra, the head being comparatively small and the elytra much more elongate in the female, both sexes having four spots on the head and an **M**-shaped mark on the prothorax black. The eyes are not prominent. The aedeagus is formed much as in *C. lituratus* and its allies. In immature examples the black markings are obsolete.

30. *Chauliognathus submarginatus.*

Chauliognathus submarginatus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 279, pl. 6, fig. 16 (♀).

♂. Aedeagus : median lobe short, curved, stout, not produced at the apex; left lateral lobe long, slender, abruptly and arcuately twisted from about the middle, the apical portion oval; right lateral lobe a little shorter than the left, strongly bowed, angularly dilated towards the base within, and armed with a small tooth at the tip. Plate VIII, fig. 34.

Hab. Nicaragua, Chontales; Panama, Chiriqui.

A close ally of *C. decolor* (= *exsanguis*, Gorh., part.), with some markings on the base of head, two lines or vittae on the prothorax, a small humeral spot or a faint marginal line on the elytra, the apices of the femora, the tibiae, tarsi, palpi, and antennae fuscous. The head of the male is considerably elongated behind and less constricted at the base than in the same sex of *C. decolor*. The third antennal joint is only about twice as long as the second.

31. *Chauliognathus sticticus.*

Chauliognathus sticticus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 280.

♂. Aedeagus: median lobe obliquely bent, rounded at the tip, and with a curved spoon-shaped projection on the ventral aspect at the base; left lateral lobe short, compressed, obliquely truncate and pointed at the tip, the apex feebly toothed at the upper angle; right lateral lobe a little longer than the left, compressed, curved, produced at the apex into a stout curved hook, and angularly dilated externally before the tip. Plate VIII, figs. 35, 35*a*.

Hab. NICARAGUA, Granada and Chontales; PANAMA, Chiriqui.

A long series, showing very little variation in colour. The head has a V-shaped mark towards the base, and the prothorax three transversely arranged spots across the middle of the disc (often united into an undulate fascia), infuscate or black, and the elytra are uniformly dilute fuscescent, like the antennae and knees. The median prothoracic sulcus is deep. Gorham omitted to notice the Nicaraguan habitat, though he labelled a specimen from that country, *C. sticticus*. The form of the aedeagus is characteristic, the median lobe having a spatuliform projection at the base beneath (not visible in our figures), and the lateral lobes are peculiarly formed.

32. *Chauliognathus sagittarius*.

Chauliognathus sagittarius, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 280 (♀).

Hab. PANAMA, Volcan de Chiriqui.

Described from three females, the male being still unknown. Very like *C. submarginatus*, but with the third antennal joint relatively shorter, it being only a little longer than the second. The head is small, and the eyes prominent; the prothorax is opaque, and has a sagittiform black streak on the disc; the fuscous marginal line on the elytra does not extend to the base or apex; the palpi, antennae, knees, tibiae, and tarsi are infuscate or black.

33. *Chauliognathus hieroglyphicus*. (Plate III, fig. 12, ♂.)

Chauliognathus hieroglyphicus, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 282.

Hab. MEXICO, Guanajuato (*Sallé* and *Dugès*: types), Tonila and Zapotlan in Colima, Lagos in Aguas Calientes and Sayula in Jalisco (*Höge*).

Var. *a*. Nigro-piceous, the prothorax sometimes in part yellow, leaving the black spots sharply defined. (♂ ♀.)

Hab. Mexico, Tonila and Zapotlan.

♂. Aedeagus: median lobe obliquely bent; left lateral lobe long, strongly sinuate, thickened in its basal half, hooked at the tip; right lateral lobe much shorter than the left, compressed, pointed at the tip. Plate VIII, figs. 36, 36*a*.

Höge has sent us a long series of this species, including various varieties, the insect having been described from a few specimens from Guanajuato. In the type-form the numerous black hieroglyphic markings on the prothorax are sharply defined, these gradually becoming more and more extended till the margins only remain yellow; the elytra have each a narrow transverse mark or spot at the base (frequently wanting), and often a rounded spot on the disc beyond the middle, black; and the legs vary in colour from almost wholly testaceous to black. The dark variety is represented by seven examples. A very distinct species, and recognisable by its shining surface and peculiar prothoracic markings, which are usually traceable in the dark form. *C. scriptus* (Germ.), from Argentina, is not unlike *C. hieroglyphicus*, but it has stouter posterior femora in the male.

34. *Chauliognathus terminalis*.

Chauliognathus terminalis, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 76.

♂. Aedeagus: median lobe obliquely bent, produced at the apex; left lateral lobe extremely elongate, slender, curved (as seen in profile), feebly hooked at the tip; right lateral lobe a little shorter and much stouter than the left, sinuous, angularly dilated on each side at the apex, and armed with a broad, acutely pointed, hook-like process before the tip above (the apex appearing trifurcate when viewed from in front). Plate VIII, fig. 37.

Hab. Nicaragua; Costa Rica.

Gorham's description of this species was taken from three specimens in bad condition. Three others have since been received, found by Pittier, at San Carlos, Costa Rica. *C. terminalis* may be known by its opaque surface, long head, with prominent eyes in the male, very slender antennae, long, subquadrate prothorax, subulate elytra,

black legs, and the black and ochreous general coloration, the ochreous colour sometimes confined to the basal half of the elytra and a portion of the under surface (the apical half of the abdomen being always black) and sometimes extending to the prothorax and to near the apex of the elytra. The aedeagus has been dissected in the two males available, and it exhibits a remarkable development of both the lateral lobes.

35. *Chauliognathus dispar*, n. sp.

Callianthia dispar, Sturm in litt. (♀).

♂. Head, antennae, prothorax, scutellum and legs black, the head with some markings in front, and the prothoracic margins narrowly (completely or incompletely) yellow, the femora sometimes testaceous at the base; the elytra varying in colour from piceous to obscure testaceous, often with an oblique testaceous streak extending from the humeri downwards, the sutural and outer margins and scutellum rarely flavous; beneath in great part ochreous; thickly clothed with fine cinereous pubescence, the prothorax shining and more sparsely pubescent. Head large, broad, subtriangular, the eyes not prominent; antennae long, filiform, joint 3 much shorter than 4. Prothorax rounded-subquadrate, bicallose on the middle of the disc, and with a short deep oblong groove in the centre. Elytra much wider than the prothorax, strongly subulate.

♀. Head shorter, sometimes wholly testaceous anteriorly, the antennae less elongate; prothorax rufo-testaceous, margined on all sides with yellow, transverse, rounded at the sides; elytra varying in colour from black to fusco-testaceous, usually with a long, oblique, conspicuous, testaceous streak extending downwards from the shoulder, the sutural and outer margins sometimes flavescent; femora sometimes wholly testaceous; ventral segments often broadly nigro-fasciate.

♂. Aedeagus: median lobe obliquely bent; left lateral lobe moderately long, sinuate, subangulate near the base, hooked at the tip; right lateral lobe a little shorter than the left, somewhat acuminate at the apex. Plate VIII, figs. 38, 38*a*.

Length (excl. head) 7–9 mm. (♂ ♀.)

Hab. Mexico (*Truqui, in Mus. Brit.; ex coll. Sturm*), Chilpancingo in Guerrero (*Höge, H. H. Smith*), Tonila in Colima (*Höge*), Cuernavaca in Morelos (*Höge; Mus. Oxon.*).

A long series of each sex, the single female in the "Biologia" collection having been left undescribed by Gorham for want of material. The two sexes of this insect are so dissimilar that they might easily be mistaken for different species, *C. dispar* in this respect approaching *C. corvinus*, Gorh., which, however, has the intermediate joints of the antennae much widened in the female. The male has the facies of a small *Leptura*. *C. flavomarginatus* and *C. constrictus* are still more nearly allied forms, the females being sometimes similarly coloured, that of the present species being separable from *C. constrictus* by the more rounded sides of the prothorax and from that of *C. flavomarginatus* by the less expanded margins. Two males have been dissected.

36. *Chauliognathus forreri.* (Plate III, figs. 13, 14, ♂, vars. β, γ.)

Chauliognathus forreri, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, p. 282 (♀).

Hab. Mexico, Ventanas in Durango [or Sinaloa] (*Forrer*: types), Rincon, Venta de Peregrino, and Tierra Colorada in Guerrero (*H. H. Smith*: ♂♀).

Var. α. The elytra with a discoidal fuscous stripe of varying extent, sometimes leaving only the sutural and outer margins flavescent, the dark spots on the head and prothorax (as in some typical *C. forreri*) reduced in number or altogether wanting. (♂♀.)

Chauliognathus subulipennis, Gorh., loc. cit. p. 282 (♀).

Hab. Mexico, Rincon in Guerrero (*H. H. Smith*: ♂♀), Tehuantepec (*Sumichrast*: types).

Var. β. The dark spots on the head larger, those on the prothorax more extended or confluent (leaving three irregular yellow streaks), the elytra wholly fuscous, the sides below the humeri excepted. (♂.) (Fig. 13.)

Hab. Mexico (*Coffin, in Mus. Oxon.*), Chilpancingo in Guerrero (*H. H. Smith*).

Var. γ. Head with two spots between the eyes, and the prothorax with 2, 4, 6, 8 or 9 spots on the disc, black, all these markings sometimes obsolete; elytra with the apical half or two-fifths black, for the rest ochreous. (♂♀.) (Fig. 14.)

Hab. Mexico, Huetamo in Michoacan (*Höge*), Venta de Zopilote in Guerrero (*H. H. Smith*).

♂. Aedeagus: median lobe obliquely bent, produced at the tip; left lateral lobe moderately long, stout, concave, dilated towards the base within, and sharply hooked at the tip; right lateral lobe much shorter than the left, compressed, curved and somewhat pointed at the tip. Plate VIII, fig. 39.

The long series of this insect obtained by Höge and H. H. Smith in Mexico connects *C. forreri* with *C. subulipennis*, Gorh., and show that they are forms of one variable species, *C. hieroglyphicus* varying in colour very much in the same way. The present species may be known by its strongly subulate elytra, dull upper surface, the rather prominent hind angles and strongly reflexed margins of the prothorax, the non-prominent eyes in the male, etc. The type is ochreous above, and pale flavous beneath, with two small blackish spots on the head and six others (arranged in two longitudinal series) on the disc of the prothorax, and the antennae, tibiae and tarsi infuscate. The legs vary in colour, but the femora are always testaceous at the base. A male of each form has been dissected, showing no variation in the structure of the aedeagus. The femora in this sex are stouter than in the female. The length (excluding head) varies from 9–13½ mm.

37. *Chauliognathus flavomarginatus*, n. sp. (Plate III, fig. 15, ♂.)

Opaque, finely pubescent; head rufescent, flavous in front, with an oblique, sinuous, interrupted stripe on each side between the eyes, extending to the base and converging posteriorly, and the under surface in part, black, the markings often obsolete above; prothorax rufescent on the disc, yellow along the margins; scutellum black, yellow at the apex; elytra flavous, with a broad, oblique, black stripe extending from the shoulder to very near the apex; antennae, apices of the femora, tibiae, and tarsi infuscate, the rest of the legs testaceous or rufo-testaceous; under surface in great part pale flavous, the metasternum nigro-fasciate behind, the last ventral segment reddish. Head very large and elongate in ♂, smaller in ♀, the eyes not very prominent; antennae long, rather slender, joint 3 a little shorter than 4. Prothorax about as long as broad, slightly shorter in ♀, sinuate at the sides and distinctly narrowed posteriorly, broadly rounded on each side in front, the hind angles rather prominent, the surface uneven and with a deep median sulcus. Elytra in ♂ a little broader than the anterior portion of the prothorax, long, strongly subulate.

♂. Aedeagus: median lobe obliquely bent, produced at the apex into a rather long spoon-shaped process; left lateral lobe moderately long, compressed, obliquely truncate at the tip, and with the upper apical angle produced into a sharp curved hook; right lateral lobe long, sinuously bent at the tip. Plate VIII, figs. 40, 40*a*.

Length (excl. head) 8½–10½ mm. (♂ ♀.)

Hab. Mexico, Huetamo in Michoacan (*Höge*).

Seven females and three males, scarcely differing *inter se*, except in the development of the black markings on the upper side of the head. This species approaches *C. forreri*, but has the prothorax strongly dilated anteriorly, deeply sulcate down the middle, and broadly flavo-marginate; the elytra with an oblique dark vitta extending from the shoulder to very near the tips. The aedeagus also very similarly shaped. The following is a more nearly allied form.

38. *Chauliognathus constrictus*, n. sp.

Dull, finely pubescent; head black, more or less yellow in front; prothorax and elytra testaceous, the former margined with yellow and sometimes with a black oblong patch on the disc, the latter infuscate on the disc from a little below the base to very near the tip (the infuscate portion sometimes becoming bifurcate anteriorly); scutellum testaceous; antennae, apices of femora, tibiae, and tarsi infuscate; beneath flavous, the metasternum black across the middle in ♀. Head moderately large in ♂, smaller in ♀, the eyes not prominent; antennae rather slender, long, joint 3 a little shorter than 4. Prothorax slightly sinuate at the sides posteriorly, oblong in ♂, more rounded at the sides in ♀, the surface uneven and with an abbreviated median groove. Elytra considerably wider than the prothorax in ♂, strongly subulate.

♂. Aedeagus: median lobe obliquely bent, spoon-shaped at the tip; left lateral lobe moderately long, rapidly widened towards the base (as seen laterally), sinuous, angularly dilated at about the middle within, the apical portion narrower, obliquely truncate, and feebly hooked at the tip; right lateral lobe long, compressed, distinctly hooked. Plate VIII, fig. 41.

Length (excl. head) 8½–9 mm. (♂ ♀.)

Hab. Mexico, Huetamo in Michoacan (*Höge*).

Three males and one female. Very like *C. flavo-marginatus*, and at first sight appearing to be nothing more than a form of that species; but differing from it

in the black head, the less expanded margins of the prothorax, the prothorax itself much narrower and subparallel-sided in ♂, the testaceous humeri and scutellum, and the angularly dilated left lateral lobe of the aedeagus. Two of the specimens have the prothorax immaculate. The somewhat similarly coloured *C. marginatus*, F., has less subulate elytra and a differently formed aedeagus.

39. *Chauliognathus histrio.*

Chauliognathus histrio, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 75, 281.

♂. Aedeagus: median lobe obliquely bent, slightly produced at tip; left lateral lobe very elongate, sinuous; right lateral lobe about one-half shorter than left, compressed, curved. Plate VIII, fig. 42.

Hab. Mexico, Durango, Vera Cruz.

Sixteen specimens seen, scarcely varying in colour, the sexes in about equal proportion. *C. histrio* is very like the form of *C. lituratus* with broadly fusco-vittate elytra, and has a similar horseshoe-shaped black mark on the disc of the prothorax; but the elytra in both sexes are greatly abbreviated, and have the apices rather broadly yellow. These two insects have the aedeagus formed as in *C. nigriceps*, and all three have been received from the same locality in Vera Cruz, Playa Vicente. As Gorham states, the present species is very like the N.-American *C. marginatus*, F., now known to extend southward to Nuevo Leon in Mexico; but the latter has stouter and more tapering antennae in both sexes, less abbreviated elytra, a broadly nigro-vittate prothorax, etc.

40. *Chauliognathus nigriceps.* (Plate III, fig. 16, var., ♂.)

Chauliognathus nigriceps, Gorh., Biol. Centr.-Am., Coleopt. iii, 2, pp. 74, 280 (♂ ♀).

Hab. Mexico; British Honduras; Guatemala, Vera Paz; Nicaragua.

Var. *a*. Elytra narrowly margined with black from a little below the base to near the apex, the black marginal streak often becoming broader posteriorly, thus leaving an indication of a yellow apical spot. (♂ ♀.)

Chauliognathus nigriceps, var., Gorh., loc. cit. p. 74.

Hab. Mexico, Playa Vicente and Cordova in Vera Cruz.

Var. β. Elytra with an anteriorly dilated sutural stripe, and the margins from a little below the base to near the apex, these markings sometimes becoming coalescent beyond the middle, infuscate or black (the dark bands thus leaving an oblique stripe extending downward from the shoulder, and a spot at the apex, ochreous). (♂ ♀.)

Chauliognathus obliquus, Gorh., loc. cit. p. 281, pl. 12, fig. 15 (♀).

Hab. Mexico (*Mus. Oxon.*), Cerro de Palmas [Plumas] in Vera Cruz.

Var. γ. Elytra black, with about the apical third ochreous; prothorax infuscate along the middle of the anterior margin; femora in part testaceous. (♀.)

Hab. Costa Rica (*Mus. Brit.*).

Var. δ. Elytra black, each with a small ochreous apical spot; the legs and a spot on the disc of the prothorax also black. (♂.)

Chauliognathus apicalis, Gorh., loc. cit. p. 75 (♂).

Hab. Mexico, Vera Cruz; Guatemala, Vera Paz.

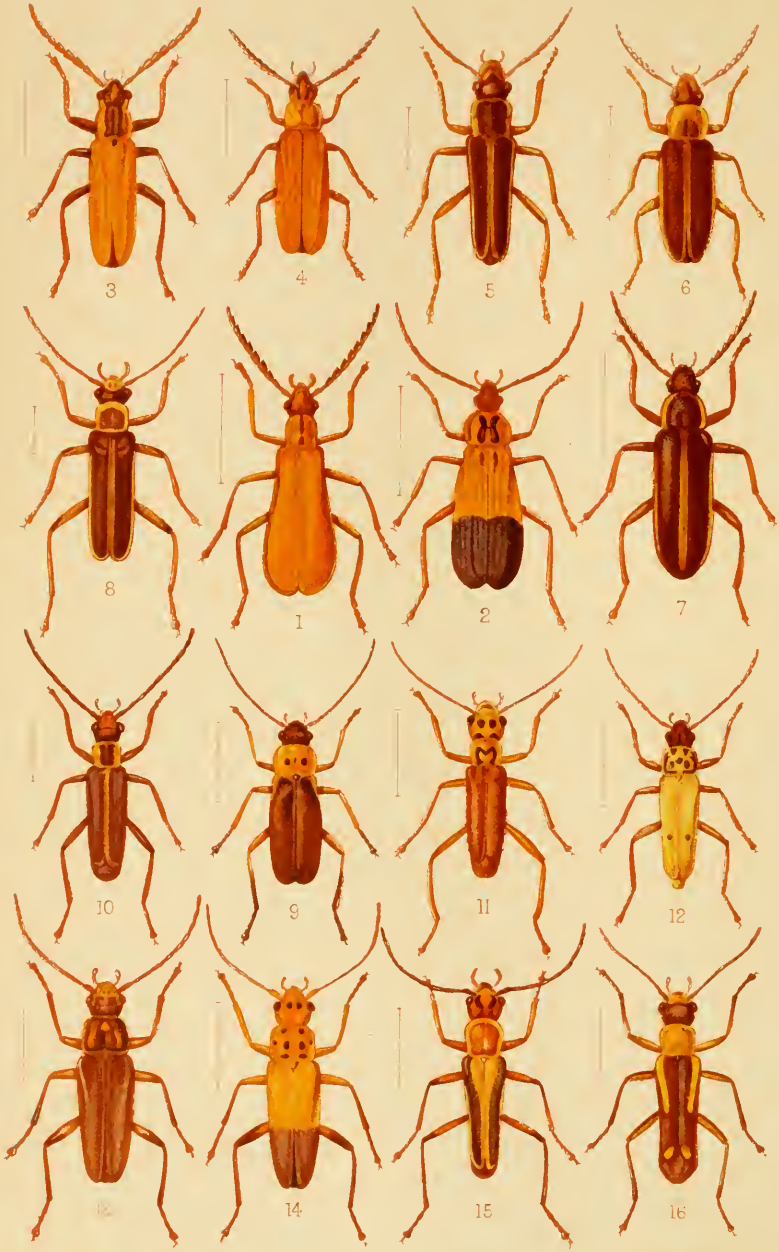
♂. Aedeagus: median lobe obliquely bent; left lateral lobe extremely elongate, sinuous, slightly hooked at the tip; right lateral lobe one-half shorter than the left, compressed, narrowed towards the apex. Plate VIII, figs. 43, 43*a*.

The numerous examples of this variable insect now available for examination (including an interesting series from Mexico in the Oxford Museum) connect the various forms named by Gorham, so that there can be no doubt as to their specific identity. He selected the form with entirely ochreous elytra as the type of *C. nigriceps*. The var. γ is represented by a single example (♀), δ (*apicalis*) by three males, and α and β by long series (♂ ♀). The legs vary in colour from almost wholly testaceous to black, but the under surface of the body is always in great part flavous. The elytra are greatly abbreviated, leaving the blackish wings and part of the abdomen exposed. *C. nigriceps* comes very near *C. histrio* (which is a form of *C. lituratus* with abbreviated elytra), but the system of coloration of the elytra is constantly different in the darker

forms, the outer limb always remaining flavous in *C. histrio* and black in *C. nigriceps*. The aedeagus of these insects is very similar in structure. The specimen figured (Plate III, fig. 16), from the Oxford Museum, is intermediate between the *C. obliquus* and *C. apicalis* of Gorham.

Explanation of Plates III—VIII.

[*See Explanation facing the* Plates.]



Horace Knight del. et lith. West, Newman. chr.

SPECIES OF CHAULIOGNATHINAE.

Explanation of Plate III

Fig. 1. *Daiphron lineatum*, Pic. ♂.
2. ,, *personatum*, n. sp., ♂.
3. *Chauliognathus* (*Daiphron*) *proteus*, Gorh., ♂.
4. ,, ,, ,, ♀.
5. ,, *corvinus*, Gorh., ♂.
6. ,, ,, (= *haereticus*, Gorh.), ♀.
[7. ,, *morio*, Gorh., ♂.]
8. ,, *exiguus*, Gorh., ♂.
9. ,, *limbicollis*, Lec., var. *scapularis*, Gorh., ♂
10. ,, *exsanguis*, Gorh., var., ♂.
11. ,, *pardalinus*, Gorh., ♂.
12. ,, *hieroglyphicus*, Gorh., ♂.
13. ,, *forreri*, Gorh., var. β, ♂.
14. ,, ,, ,, , var. γ, ♂.
15. ,, *flavomarginatus*, n. sp., ♂.
16. ,, *nigriceps*, Gorh., var., ♂.

Explanation of Plate IV.

♂. Genital armature.

The figures on this and the following plates (all × 20) show the aedeagus or genital armature (= tegmen and median lobe united, the portion of the membranous internal sac sometimes seen extruding from the anterior aspect of the median lobe omitted) of the males, mainly from the dorsal aspect, or in profile, somewhat obliquely. The apical portions are placed forwards. The asymmetric lateral lobes are described from this view in the accompanying text, and are therefore reversed from their actual position in the insect.

Figs. 1, 1*a*. *Daiphron lyciforme*, Gorh. : 1, profile, showing membranous base of median lobe; 1*a*, dorsal aspect.

2, 2*a*. ,, *personatum*, n. sp.: 2, profile; 2*a*, dorsal aspect.

3, 3*a*. ,, *lineatum*, Pic : 3, profile; 3*a*, dorsal aspect.

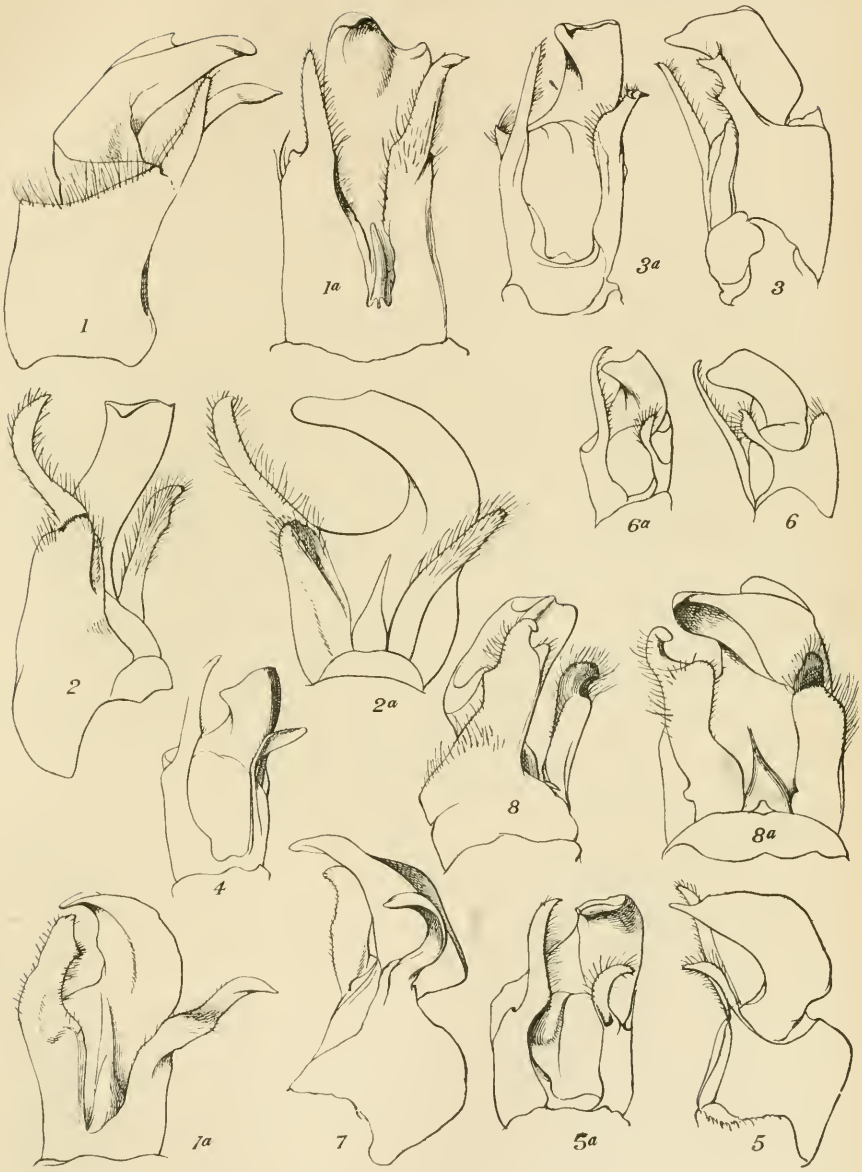
4. ,, *crassicorne*, Gorh. : 4, dorsal aspect.

5, 5*a*. *Chauliognathus proteus*, Gorh. : 5, profile ; 5*a*, dorsal aspect.

6, 6*a*. ,, *corvinus*, Gorh. : 6, profile; 6*a*, dorsal aspect.

[7, 7*a*. ,, *morio*, Gorh. : 7, profile; 7*a*, dorsal aspect.]

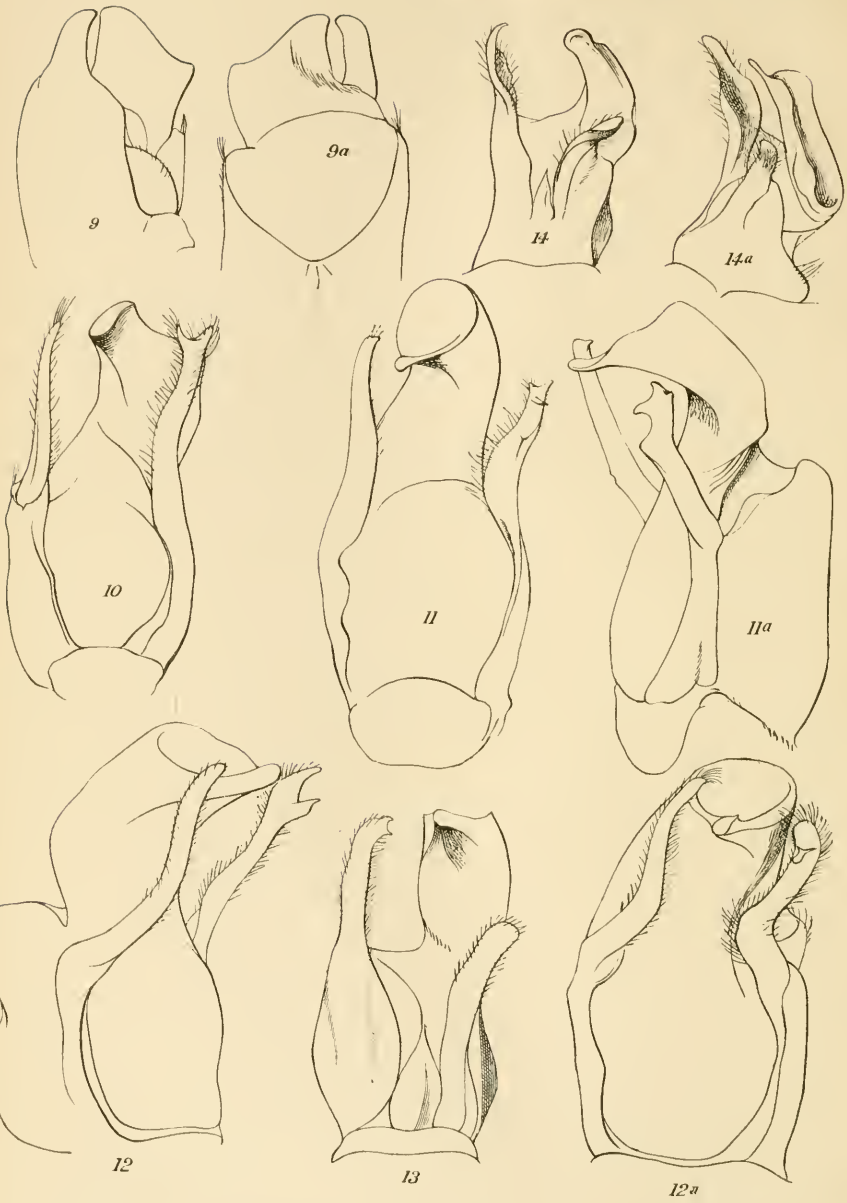
8, 8*a*. ,, *sodalis*, Waterh. : 8, profile; 8*a*, dorsal aspect.



H. Knight, del.

C. Hentschel, imp.

GENITAL ARMATURE OF CHAULIOGNATHINAE.



H. Knight, del.

C. Hentschel, imp.

GENITAL ARMATURE OF CHAULIOGNATHINAE.

Explanation of Plate V.

♂. Genital armature.

Figs. 9, 9*a*. *Chauliognathus tripartitus*, Chevr. : 9, profile; 9*a*, ventral aspect, showing membranous base of median lobe.

10. ,, *heros*, Guér. : 10, dorsal aspect.

11, 11*a*. ,, *dimidiatus*, Waterh. : 11, dorsal aspect; 11*a*, profile.

12, 12*a*. ,, *faustus*, Gorh. : 12, profile; 12*a*, dorsal aspect.

13. ,, *distinguendus*, Waterh. : 13, dorsal aspect.

14, 14*a*. ,, *lecontei*, n. sp. (= *profundus*, Gorh.): 14, dorsal aspect; 14*a*, profile.

Explanation of Plate VI.

♂. Genital armature.

Figs. 15, 15*a*. *Chauliognathus profundus*, Lec. (= *togatus*, Waterh.): 15, profile, left view; 15*a*, dorsal aspect.

16. ,, *nigrocinctus*, Gorh. : 16, dorsal aspect.

17. ,, *bilineatus*, Gorh. : 17, dorsal aspect.

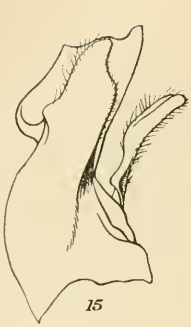
18, 18*a*. ,, *collaris*, Gorh. : 18, profile, left view; 18*a*, dorsal aspect.

19. ,, *vestitus*, n. sp. : 19, dorsal aspect.

20, 20*a*. ,, *aterrimus*, Gorh. : 20, dorsal aspect; 20*a*, profile, left view.

21. ,, *exiguus*, Gorh. : 21, dorsal aspect.

22, 22*a*. ,, *limbicollis*, Lec.: 22, dorsal aspect; 22*a*, ventral aspect, showing membranous base of median lobe.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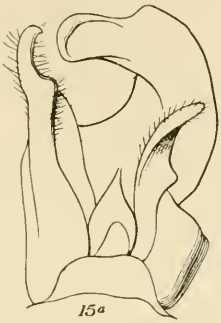
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18a


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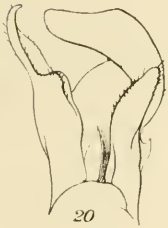
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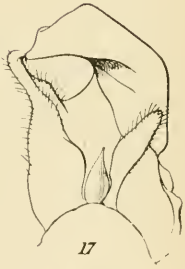
20a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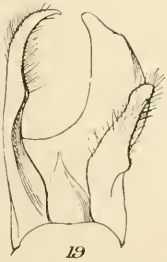
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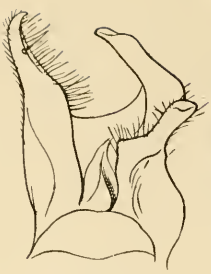
H. Knight, del.

C. Hentschel, imp.

GENITAL ARMATURE OF CHAULIOGNATHINAE.

23



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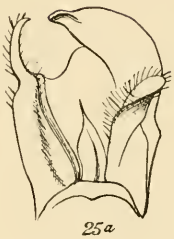

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H. Knight, del.

C. Hentschel, imp.

GENITAL ARMATURE OF CHAULIOGNATHINAE.

Explanation of Plate VII.

♂. Genital armature.

Figs. 23, 23*a*. *Chaulio nathus mundus*, n. sp. : 23, profile, left view; 23*a*, dorsal aspect.

24. ,, *scutellaris*, Lec. : 24, dorsal aspect.

25, 25*a*. ,, *discus*, Lec. : 25, profile; 25*a*, dorsal aspect.

26 ,, *marginatus*, Gorh. : 26, profile.

27, 27*a*. ,, *sulphureus*, Waterh. (= *pallidus*, Gorh.) : 27, profile ; 27*a*, dorsal aspect.

28, 28*a*. ,, *pallidus*, Waterh. (*oedemeroides* and *fuscescens*, Gorh.) : 28, dorsal aspect; 28*a*, right (left) lateral lobe.

29. ,, *exsanguis*, Gorh. : 29, profile.

30. ,, *decolor*, n. sp. : 30, profile.

31. ,, *evanidus*, n. sp. : 31, profile, left view.

32. ,, *pardalinus*, Gorh. : 32, profile.

Explanation of Plate VIII.

♂. Genital armature.

Figs. 33, 33*a*. *Chauliognathus lituratus*, Gorh. : 33, profile; 33*a*, dorsal aspect.

34. „ *submarginatus*, Gorh. : 34, profile.

35, 35*a*. „ *sticticus*, Gorh. : 35, profile; 35*a*, dorsal aspect.

36, 36*a*. „ *hieroglyphicus*, Gorh. : 36, profile; 36*a*, dorsal aspect.

37. „ *terminalis*, Gorh. : 37, profile.

38, 38*a*. „ *dispar*, n. sp. : 38, profile; 38*a*, dorsal aspect.

39. „ *forreri*, Gorh. : 39, dorsal aspect.

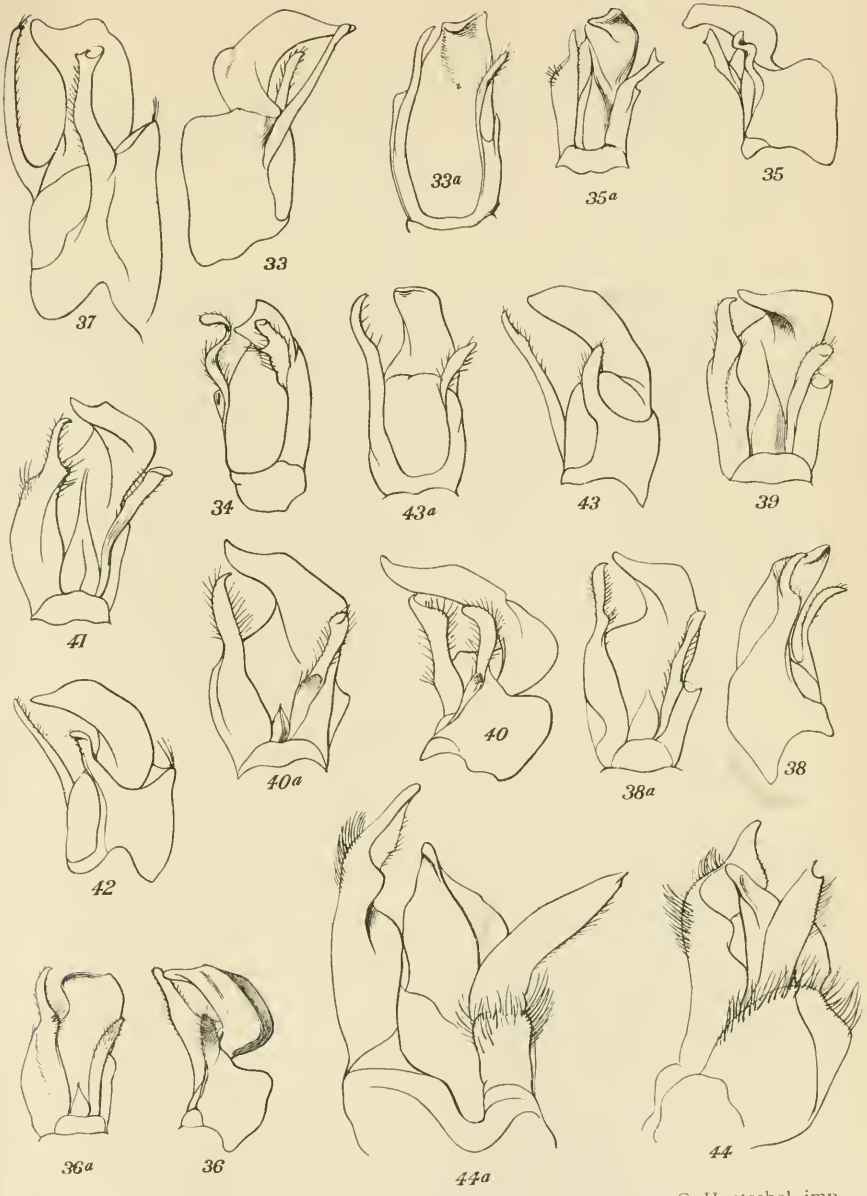
40, 40*a*. „ *flavomarginatus*, n. sp. : 40, profile; 40*a*, dorsal aspect.

41. „ *constrictus*, n. sp. : 41, dorsal aspect.

42. „ *histrio*, Gorh. : 42, profile.

43, 43*a*. „ *nigriceps*, Gorh. : 43, profile; 43*a*, dorsal aspect.

[44, 44*a*. „ (?) *procerus*, Bourg. (from New Guinea) : 44, profile; 44*a*, dorsal aspect. Figured for comparison with American forms.]



H. Knight, del.

C. Hentschel, imp.

GENITAL ARMATURE OF CHAULIOGNATHINAE.

IV. *A remarkable new genus and new species of* Odonata, *of the legion* Podagrion, *Selys, from North Queensland.*

By Kenneth J. Morton.

[Read February 4th, 1914.]

Plate IX.

The recent appearance of three important memoirs by Ris * and Tillyard † relating to the Odonata of the Austro-Malayan region turned my attention to the Zygoptera of a small lot of dragon-flies which I obtained a few years ago purporting to come from Cape York, North Queensland. From the character of the larger species in the collection, there seems to be no reason to doubt the correctness of the locality. As far as I have been able to examine the smaller insects, they appear to belong to described species with the exception of one example which proves to be of rare interest in respect that the proximal side of the quadrilateral is absent in the fore-wing, a peculiarity, as far as I know, hitherto considered unique in the Australian *Hemiphlebia mirabilis*, Selys. On sending a short account of this insect to Dr. Ris, he informed me that he was acquainted with nothing like it either in nature on in the literature and he urged its early description. Subsequently when forwarding some other material to Dr. Ris, I included the Cape York insect. He confirmed his former view, and kindly volunteered to make wing photographs which lighten so much the work of description.

The species, of course, forms the type of a new genus. Notwithstanding the important character above alluded to, it cannot, however, be referred to even the same Legion (*Agrion*) as *Hemiphlebia*, and it seems to find a more natural place in the Legion *Podagrion*. The rather heavy pterostigma, the character of the appendages and the

* "Odonata von den Aru- und Kei Inseln," etc.: Abhandl. der Senkenbergischen Naturforsch. Gesell. Bd. xxxiv, pp. 503–536 (1913).

"Resultats de l'Expedition Scient. Neerlandaise à la Nouvelle-Guinée," vol. ix, Zoologie, Livr. 3, pp. 471–512: Odonata.

† "On some new and rare Australian Agrionidae:" Proc. Linn. Soc. of N.S.W., 1912, vol. xxxvii, part 3, pp. 404–479 (1913).

evident relationship with *Synlestes* and *Chlorolestes* are favourable to this association in spite of the absence of supplementary sectors which have been regarded as essential features of the *Podagrion* genera, *Perilestes* alone being without them.

Chorismagrion, nov. gen.

Nodus about one-third of the distance between the base of the wing and the distal side of the pterostigma. Basal side of the quadrilateral absent in fore-wings as in *Hemiphlebia*. In hind-wings, anterior side of the quadrilateral about $\frac{2}{5}$ the length of the posterior.

A* separates from the inner margin distad to Cuq at above the level of the costo-distal angle of the quadrilateral. The two Anq placed at nearly equal distance from each other and from the base of the wing and nodus respectively. Cuq placed nearer 1 Anq, about $\frac{1}{3}$ of the distance between 1 and 2 Anq. Cu^1 arched at the base. M^3 from or very near the sub-nodus; Rs at about 4 Pnq in fore-wings, and 3 Pnq in hind-wings. M^2 three cells further; M^{1a} about two cells still further (but rather unstable ranging from between one-third and one-half the distance between the nodus and the proximal side of the pterostigma). Supplementary sectors absent.

Second joint of antennae rather more than twice the length of the basal joint, the third longer than the first two together.

Legs slender with rather long and fine spines; claws long with a well-defined tooth. Superior appendages forcipate. Ligula cleft for about $\frac{1}{3}$ of its length, the lobes rather narrowly separate, tapering but blunt at the apex.

Chorismagrion risi, n. sp.

♂. The whole of the head behind the antennae dull black; vertex frons nasus rhinarium and labrum brilliant metallic green with violet reflections; genae, base of the mandibles and basal joints of the antennae yellowish; last joint of antennae black. Underside of mouth parts mostly yellowish.

Pronotum mostly orange broadly black at the sides. Mesepisterna orange, slightly infuscated, dorsal carina black; mesepimera, mesinfraepisterna, metepisterna and a small triangle of metepimera near the bases of hind-wings blackish with traces of yellow near the wing-bases. Underside of thorax and the legs, pale yellowish.

Abdomen very dark green or blackish probably becoming bronzed, first and second segments with the dorsum broadly yellowish, the

same colour apparently continued narrowly along the dorsum of 3rd segment; 9th segment yellowish or orange above, probably 10th segment partly marked with the same colour. Proximal ends of segments 4, 5 and 6 above and 3, 4, 5, 6 and 7 beneath marked or ringed with whitish.

Superior appendages longer than 10 and rather shorter than 9. Viewed from above they are broadest at the base at first slightly divergent then rather abruptly they converge becoming flatter or somewhat concave after the geniculation. About half-way between the head and the rounded apex, above, an interruption simulating a joint. Seen from the side these appendages are nearly straight and void of striking character save the indication of the false joint.

Inferior appendages about $\frac{1}{3}$ as long as the superior. Viewed in profile, they are somewhat triangular with a conspicuous process; seen from beneath they are closely approximate for about two-thirds of their length, each terminating in a divergent curved process; between these processes there appear to be blades with spinulose edge.

Wings hyaline very faintly tinged with brownish, especially between costa and radius. Pterostigma short and broad, dark brown or blackish with a large orange spot which touches the costa.

♀. unknown.

Length of abdomen, 34 mm.; hind-wings, 22 mm.

I have pleasure in dedicating this interesting species to Dr. Fr. Ris, Rheinau, the distinguished Monographer of the Libelluninae, in recognition of many kindnesses received at his hands during a friendship of over twenty years.

Of Australian genera, *Chorismagrion* is perhaps most closely related to *Synlestes*, although differing therefrom in several important respects in addition to the absence of the basal side of the quadrilateral in the fore-wings. In *Synlestes* the anterior side of the quadrilateral is about one-half the length of the posterior side; M^3 separates from M 1 + 2 proximal to the sub-nodus; Rs at the sub-nodus; Cu^1 and Cu^2 more closely approximate at their origin, Cu^1 more strongly arched. Supplementary sectors present.

To the South African genus *Chlorolestes*, the relation of *Chorismagrion* is also rather close. In this genus, M^3 separates from M 1+2 at the sub-nodus: Rs at Pnq 2; Cu^1 less strongly arched than in *Synlestes*; supplementary sectors present.

Prof. Calvert in his recent paper:* "The Fossil Odonate *Phenacolestes*, with a discussion of the venation of the legion *Podagrion*, Selys," gives a synopsis of the venational characters of this legion. The new genus would fall under—

AA.—M^3 separating from M 1+2 at the sub-nodus, only two antenodals, Rs beginning distad to the sub-nodus.

VV.—Area posterior to Cu^2 with one row of cells, one cubito-anal cross-vein.

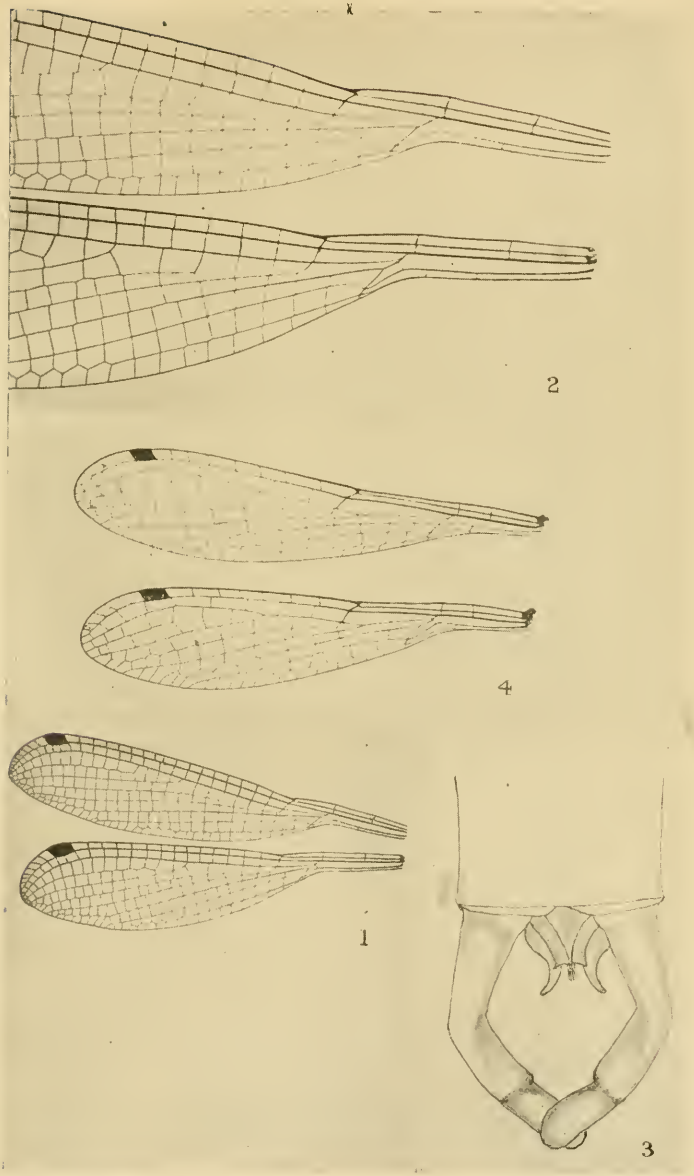
For *Chorismagrion* a new rubric preceding *Chlorolestes* is required, based on the absence of the basal side of the quadrilateral and the absence of supplementary sectors. In regard to these latter it may be well to call attention to the minute rudiment at the edge of the wing between M^2 and Rs in the new genus.

The opportunity is suitable for giving a good wing photograph of *Hemiphlebia*, which Dr. Ris has also kindly supplied, as none of the existing figures seems to give a direct photographic representation of the wing. In sending this photograph he points out the existence of a minute cross-vein between A* detached from the anal margin and this margin, just at the Cuq. This detail, which Dr. Ris says is not known to him in any other Agrionid, is so minute in the photograph that it may be lost in reproduction. In one of my specimens it is more distinct, but it does not appear to be constantly present, and Tillyard's figure truly represents in this respect the condition of another example in my collection.

* Proc. Academy Nat. Sciences of Philadelphia, 1913, pp. 225–272.

Explanation of Plate IX.

Fig. 1. Wings of *Chorismagrion risi* (nat. length of h.-w. 22 mm.).
2. Wings of *Chorismagrion risi*, basal part more enlarged.
3. Apex of abdomen of *Chorismagrion risi*, from above.
4. Wings of *Hemiphlebia mirabilis* from Alexandra, Victoria (nat. length of h.-w. about 11 mm.).



Photo, K. J. M. *C. Hentschel.*

CHORISMAGRION RISI.

V. *The Egg-laying of* Trichiosoma (Tenthredinidae). By T. A. Chapman, M.D., F.Z.S.

[Read February 4th, 1914.]

Plates X–XVI.

In the Presidential Address to the Entomological Society on January 12, 1912, by the Rev. F. D. Morice, we have a résumé and critical estimate of all that was known up to that date concerning the action of the ovipositors (saw, terebrae) of the sawflies (*Chalastogastra*), together with some very careful and important observations by Mr. Morice himself on one species of the group.

This Address stimulated my interest in the operation of oviposition in the sawflies, which I had often wished to observe, but had never succeeded in actually seeing.

It curiously happened that in the spring of 1913 an extremely favourable opportunity of doing so occurred to me, and the details observed seem to be worth relating, because they were so very clearly seen, and for another circumstance which appeared as a result, viz. that they differ to some extent in the different species (or genera ?) of sawflies, and that consequently my observations are not merely a confirmation of Mr. Morice's report, but rather an extension in a new direction.

It was on the 22nd April, 1913, that I saw in the marshes at Reazzino, near Locarno, a specimen of *Trichiosoma betuleti* (?) in the act of laying an egg in a leaf of a small smooth round-leaved sallow. I watched it lay a second egg, but not having a lens did not see much of the process. On the way home I found another specimen of the same species at rest on a poplar trunk. A good many searches on later occasions failed to result in the discovery of any further specimens. These two flies I took home and kept in captivity for two or three weeks.

I was very much struck by their quiet sluggish behaviour and by the fact that during the whole time I had them, neither of them made any attempt to use her wings.

I think it is probable that both had already laid the majority of their eggs, as they were rather hollow in appearance and only laid a dozen or so eggs each for my benefit.

I only gave them access to material on which to lay, when I was at liberty to observe them, so that I was able to follow the whole operation in the case of every egg that was laid.

I fed them occasionally on water, neither sugar nor sap expressed from the sallow seemed to tempt them. They took the water freely but with extreme slowness, as if it had to be absorbed rather than swallowed. This was accompanied by what might be called chewing movements of the maxillae, labium and palpi. The centre of the mouth parts could not be well seen during the sucking process, but seemed to have a bag-like appearance.

What made the examination of the whole process of egg-laying so easy to observe, and therefore (comparatively) so easy to understand, depended on the large size of the insect, on its very placid nature so that when laying it could be moved into any position and approached as closely as necessary with a lens, without in any way disconcerting it. It was further facilitated by the circumstance that the most satisfactory way of looking at the process, viz. in profile, was also the most obvious and easiest. The upper cuticle of the leaves, beneath which the pouch for the egg is made, is perfectly transparent and the rest of the leaf quite translucent.

The sallow on which I found the *Trichiosoma* laying belonged to the *Caprea* group, but I do not know its name; it had a somewhat regular oval leaf, rather small, and in the young state in which the eggs were laid it is quite glabrous. This last seemed an important character to the instinct of our sawfly. Having difficulty in getting the desired sallow, I tried the flies with other species of *Salix*, but they refused all I tried except one that seemed to me to have nothing in common with the original sallow, except that its leaves were glabrous; this was a willow, possibly *Salix fragilis*, grown in the vineyards at Locarno, for training the vines on and for supplying withes for tying them. In describing the leaves of these two species as glabrous, I am not strictly accurate, they were glabrous compared with other available species of *Salix*, and really seemed so when only the immature leaves that suited the *Trichiosoma* were uncritically observed, but they actually had some hardly visible hairs that were more obvious when the leaves matured.

The leaves selected by the flies were those that were

nearly but not quite fully expanded and had very delicate tissues, younger leaves were several times accepted but never older ones.

Poplars margined the wayside where I found the insects, and as the quality of its leaves is very similar to that of the *Salices* affected, I think it not improbable that the poplar is also patronised.

The subject of this paper is the action of the saws, so that the precise determination of the species of *Trichiosoma* observed is of less importance. This is fortunate, as Mr. Morice does not find it easy to say which species is in question; for my purpose it will be enough to report that he says, "I should feel quite certain that it was *betuleti*, Kl., if only you had not found it on *Salix*—" "—*betuleti* has always been believed to be exclusively attached to *Betula* and—mainly on that account—has long been reckoned as a variety of the well-known and universally distributed *T. lucorum*, which abounds wherever *Betula* is plentiful. The only two species recorded as attached to *Salix* are *latreillii* and *sylvatica*; yours, I am satisfied, can be neither of these, unless all Trichiosomas are forms of a single species."

He adds that the species is almost certainly the *betuleti* of Costa, which is placed by Cameron under *lucorum*, and is not the species given as *betuleti*, Kl., by Cameron ("British Phytoph. Hymenoptera," Ray Soc. Vol. III, pp. 22–24).

I have various notes made at the time, some of which I may quote. I also made some rough diagrams of the progress of the operation of cutting the pockets, etc. These I elaborate a little, but they still remain only diagrams; I am no draughtsman, but if I were, the operation, though slow enough for observation, is much too rapid for any careful drawing.

On April 26, I note that I saw "5 eggs laid on the smooth narrow-leaved willow. The sawfly crawled about in a haphazard sort of way, much as when moving with no obvious object. Almost unexpectedly, however, she would come to a spot with the end of the abdomen against the margin of the leaf, and there resting, a rhythmical movement of the end of the abdomen took place; at first this seems to be a process of the two larger front eminences endeavouring to get a hold of the margin of the leaf or some sort of fixity in regard to it, so that the saws could properly begin to operate."

These "eminences" I take to be what Mr. Morice calls "the apical plates of the saw sheath," they remind me in position and structure of the 10th abdominal segment of many female Lepidoptera, a pair of rounded plates, well clothed with hairs, not densely, but spread and especially marginal, and impressed one that they were for precisely the same office as the very important one in the Lepidopterous structure, viz. to verify that the situation selected, and in fact to select it, is exactly what is required, in the one case for laying the egg, in the case of the sawfly, for cutting the pocket.

The insect is resting on the leaf with legs on both sides of it, and with this fulcrum is able to press the abdomen sufficiently against the leaf. The two apical plates do not grip the leaf, but still, with its margin actually or apparently between them, give the selected place the required steadiness. The one facing the observer covers the actual point of entry of the saws, but the movements noted above are really the beginning of their operation and their actual entry into the leaf. They do so "on the upper surface, but so close to the margin that I am not quite positive that the actual margin is not the real or intended place. When the operation is finished it is practically impossible to verify any actual opening, but one guessed it to be some 0·1 mm. from the margin on the upper surface. The body of the insect is so placed that the plane of the leaf coincides with the median antero-posterior plane of the insect." Fuller observations on more specimens of the work, shows that the incision is on the upper surface, parallel with the margin and nearer 0·3 mm. from it than the distance noted above. "When once the saw enters it works very rapidly and the full extent of cutting is done in from about a minute to a minute and a half. This is guessed, as I was too intent on observing the process to note the watch at the same time; but in one instance, I found that there was a rest of 10 seconds at the end of the cutting, and that the laying of the eggs and extraction of the saw took place in 15 seconds. In observing the action of the saw, two circumstances made this much more satisfactory than I had anticipated. One was the absolute transparency of the upper cuticle of the leaf, beneath which the saw penetrated, the parenchyma of the leaf being below the saw; the other was that during part of the operation, a portion of the saw between the leaf and the body of the

insect was free, so that taking the insect in profile, the whole process was very easily seen, the saw within the leaf being but little obscured by the translucent leaf substance below it cutting off the light. Nothing, however, could be seen from the lower side of the leaf owing to the thickness of the leaf substance between, which, though translucent, was by no means transparent."

"When the saw is first seen to have really entered the leaf, the darker posterior (in the then position of things) portions of the saw (the 'supports') advance slowly, steadily and uniformly together; whilst the anterior members (the 'saws') are seen to be in rapid motion."

To understand the method of this movement, it is necessary to remember the structure of the whole terebra. This, as it exists in *Trichiosoma*, is shown in the photograph on Plate XV, and in figs. 11 and 12 of Plate XVI.

Mr. Morice calls attention to the fact that these terebrae present in different species, different relative developments of the "saws" and "supports," no doubt in accordance with slightly different methods of operation according to the requirements of each species in regard to the material in which the eggs are laid and their disposition therein. The justification for my recording my observations is that in *Trichiosoma* the details of structure and procedure do differ from those observed by Mr. Morice in *Phymatocera aterrima*, Kl. In that species both saws and supports terminate together in what forms an acute point to the terebra, which apparently makes its first entry by a process of stabbing. In *Trichiosoma* there are no sharp points, the saws continue round the ends of the support, so that the end of the terebra is not a point, but a continuation of the cutting edge of the "saws," which even go round the support so far that the cutting edge at their tips faces in a posterior rather than an anterior direction.

Mr. Morice tells us that these terebrae are not merely objects in two dimensions but in three, and have a thickness that in some species probably enables them to act more or less as wedges. Though an object of two dimensions only is a mere mathematical abstraction, nevertheless in *Trichiosoma* the whole cutting action takes place in such a way that we need not take into account that it has any thickness, it is indeed so thin that one almost wonders how it can possess the necessary strength. Each saw and support has indeed a structure much like that of a

lattice girder, so as to secure much stiffness, and any buckling is prevented by the instrument being confined beneath the leaf cuticle at the time when it is subjected to the greatest strains.

The saw "is curled right round the end of the guide (support) and goes to and fro rapidly, without however altering its position. At first glance the movement is rather a twinkling than a to-and-fro movement, but it is soon realised that, the saw being double, one portion advances as the other retreats. This is easily seen in the portion between the leaf and the insect, where there is nothing either in front or behind the saw.

"The cutting is done by the margins of these two pieces at the end, and advancement is rapid, steady and uniform, but the actual alternating movement of the saws across the line of advance is much more rapid than the actual advance, perhaps four or five times as rapid."

The penetration of the leaf is first directly inwards from the edge, and during this period the cutting is done by the portions of the saws that curl round the end of the supports. When the terebra is engaged to its full length directly inwards, it has cut a space under the cuticle just sufficient to hold it, or wider by the trifling amount that the saw curls round to the other side of the support. The twinkling continues but the cutting is now done forwards by the front margins of the saws, and continues doing so till the terebra swinging forward is about parallel to the edge of the leaf, with its extremity in the same direction as the insect's head, and has behind it a free space or pocket approximately circular. "When this position is reached a short rest takes place, then, after some 10 seconds or so, some movements hardly affecting the terebra, but of a similar but rather slower and more heaving character than when cutting is being done, take place more in the body of the insect than in the terebra. This is hardly noticed before the egg begins to occupy the saw, which resumes movements similar to those used in cutting and which probably assist the advance of the egg between its right and left portions, which must now be separated enough to admit of its passage, though the distension is too slight to be observable. "The actual egg when laid is a fairly large and thick oval body that occupies practically the whole pocket. In the actual laying the appearances seem to compel one to believe that in its

passage the egg is drawn out into a long spindle shape. The egg gradually appears at the anterior margin of the saw, the saw working as during cutting, not at its base but along its whole length, and whilst the saw is still in the position in which it stopped cutting. Gradually the egg grows larger and, in doing so, the saw passes back into the lower portion of the space cut, apparently pushed by the increasing egg, and when the saw is quite pushed back the whole egg is seen to be present and the saw (terebra) is in a second or two withdrawn. At the first appearance of the egg only a narrow margin is occupied by the portion present, and one can only suppose that the shell is sufficiently extensible for the rest of it to be in the basal portion of the saw and the body of the insect." When half laid it must have quite a dumbbell shape, one rounded end in the pocket, the other within the body of the insect, the narrow connecting portion in the neck of the terebra.

It may be observed here that in *Phymatocera* the terebra was withdrawn after the pocket was cut and replaced to lay the egg, but in *Trichiosoma* no such break occurred, only a short rest being taken with the terebra still *in sitû*.

Mr. Morice, indeed, relates that the process of rotation towards the body of the insect, apparently precisely like that in *Trichiosoma*, was not as in *Trichiosoma* stayed when a pocket was formed, but continued until the terebra cut its way out, and in the result, the process being repeated, there was a long clean cut or slit with a succession of eggs, laid along it. In *Trichiosoma*, the original incision of entry is never enlarged, and each egg is laid in a separate and independent pocket.

"On one occasion the saw came to a vein in the leaf, which it seemed to find to be an impediment and it was at once withdrawn. On another occasion the pocket was all but finished, but the original line of entry seemed to have been too oblique, with the result that the forward movement of the saw brought it to the margin of the leaf before the pocket was quite large enough, though to my eye it was very close to full size. This was not, however, satisfactory, and the saw was withdrawn without any egg being laid."

"April 27th. Sawfly quite refused to experiment with a slightly rough hairy-leaved willow. Saw two eggs laid to-day on smooth willow. Timed one of these. From the fly settling down to the saw actually entering forty seconds (40″), from this to completion of the straight entry,

one minute (60″); to the completion of cutting, further fifty seconds (50″). Then ten seconds (10″) rest, and in fifteen seconds (15″) more, the egg was laid and the saw withdrawn."

On this occasion by giving attention to the point it was clearly seen that the points of the saw curled round far enough to cut a narrow portion behind the guide.

I ought to have noted that in captivity at least it seemed quite immaterial to the flies whether their heads when laying were directed towards the tip or the base of the leaf, nor did I notice that the legs were disposed in any constant manner to secure a correct foothold.

On May 1st the two Trichiosomas were getting rather exhausted (they had probably been in existence some time when captured). One could not be got to lay; the other laid two eggs, but was rather stupid about it, as though her instincts were failing. She kept getting too much on the face of the leaf instead of on the edge, so that on three attempts she failed to penetrate the leaf, the end of the saw being too vertical to the face of the leaf and not in the same plane with it, though I would not be positive that she did not penetrate the cuticle but could then go no further. On the two successful occasions, either from being out of proper alignment or simply from exhaustion, after taking about a usual time, 1′ 20″, to pierce, and 1′ 0″ to traverse, she then rested in one case 3′ 0″ and in the other 4′ 0″ instead of the usual 10″ or 15″, the actual laying and withdrawing being as usual. Certainly the day was dull and cool; for a successful observation a fairly warm day and suitable fresh *Salix* were always necessary.

The eggs were laid in leaves on cut branches in water, so that their not increasing in size may be their usual habit, or may have been the result of a want of a natural flow of sap in the plant. The eggs I have had of several species of sawflies have expanded in this way very notably. I fancy, however, this species does not do so, as the egg duly hatched in an apparently normal manner. On May 1st, eggs laid on April 22nd had shown for several days the outlines of the contained larva, as a denser circle within the margin, but all very translucent and free from visible structure except one small brown spot; at this date the spot had got larger and more distinct, and had a rhythmical to-and-fro movement, approaching and receding, by a small distance, the end of the egg nearest the inlet to the

pouch (micropylar end?). The movement occurred to and fro twenty times in a minute in one case in which I counted it. In another egg it is slower and in a younger egg, in which the spot is not so well developed, it occurred only at considerable intervals. On investigation it appeared that the brown spot is one of the eyes of the larva, quite distinct, being only under the transparent cuticle of the leaf; the other is invisible, being on the other side of the head and can only be glimpsed from below, owing to the thickness of the parenchyma of the leaf. The movement is really a periodical rotation of the head of the larva.

The movement in the earliest (April 22nd) eggs ceased on May 3rd, and on May 4th the first larva hatched. The young larva is very large for the size of the egg, 7 mm. long, green, with large brown (or black) eyes and a dark spot in the middle of the labrum. It escapes by an irregular tear in the thin cuticle, sometimes of considerable length, sometimes small, so that it seems the larva could hardly have got through it.

On the 14th of May the larvae had moulted to 2nd instar, the largest 15 mm. long, but not yet full-grown in that instar. They are pale, almost colourless, except for intestinal contents. They become rather white and opaque, and the interior obscured, by an efflorescence, which is not present just after moult and easily rubs off. Except for size these larvae were very like those one is familiar with on hawthorn. Exigencies of travel led to their being so ill used that several reached the 3rd instar, but none got any further.

The egg all but fills up the pouch and measures 2·5 mm. parallel with the length of the leaf and 2·0 mm. across, the branch of the pouch towards the opening seems to get more or less glued together and is sometimes quite visible, in other cases cannot be made out.

In carefully watching with a good lens the laying of some two dozen eggs, the question present to me was always how is the cutting actually done, is it cutting, carving, tearing or what? I concluded that it was none of these, but really the action of scissors, something like the action of a reaping- or mowing-machine, or even more closely of horse-clippers. Each of the projections of one of the "saws" in passing a similar projection of the other acted with it as a pair of scissors cutting through the scrap of tissue caught between them. In making the pocket, *i. e.*

in separating the layer of cuticle, what has to be cut through is the vertical walls of the cells of the leaf, which being only the divisions between the cells, have much less area than the whole of the pocket, and being very thin and (in these young leaves) very soft and tender, are easily caught between the projecting blades of the saws and cut through. The actual beginning of the process, the entrance of the terebra into the leaf, was always obscured by the portion of the sheath referred to already. It always took a time greater in proportion, one felt, than the cutting of the pocket afterwards. This resulted, no doubt, from the fact that cutting had here to take place over the whole line of advance and not merely at the widely separated dissepiments of the leaf cells. The flies would only use young and tender (in fact, not fully grown) leaves, and whilst this would facilitate the cutting at all stages of the process, it would be important at the first penetration, as the saws could not cut unless the cuticular tissue was soft enough for them in some degree to indent it. This advantage or necessity would of course be much the same whatever the precise manner of cutting was. The analogy or rather identity with scissor action, or multiple scissor action as in horse-clippers, is perhaps more easily realised when it is called to mind that the two saws are strengthened lattice-girder fashion by transverse thickenings on their outer surfaces, which are thus uneven and irregular, but that their opposed faces are quite flat, sliding smoothly on each other precisely as is the case with the opposed faces of scissors or clippers.

Mr. Morice has added to my indebtedness to him in the matter of this *Trichiosoma* and its correct position as a species, by giving me the photographs on a much enlarged scale of the extremity of the terebra, and still more enlarged of its cutting edge, which are reproduced on Pl. XII.

Explanation of Plates X—XVI.

Plate X shows *Trichiosoma* in its relative position to the leaf when ovipositing. Photograph from a specimen mounted on a leaf that had an egg laid in it. The pocket from which the larva duly hatched is seen on left, opposite end of wing. The terebra is in

about the position it occupies when the direct penetration is nearly completed, but *on* the leaf instead of in it. Magnified × 3.

The photographs on Pl. XI show the terebra of one of my actual flies × 25. I have found it impossible to mount for photography the terebra with the two blades in natural opposition. Here they are somewhat slid apart, with this advantage, as it happens, that the two saws are not advanced to precisely the same place in each : in one it is fully advanced, in the other somewhat withdrawn, and their actual movement in cutting is alternately from one position to the other, the one advancing as the other retreats. The other photograph, from a specimen not taken by me, shows the terebra separated into its four constituents, two guides or supports and two saws—a condition to which they are only too easily reduced in mounting.

Plate XII shows the further enlargements of the extremity and margin of the terebra, for which I am indebted to Mr. Morice.

It seemed desirable in order that my notes should be capable of being easily understood that I should present some figures. For this purpose, I have in some degree improved the diagrams I made at the time, but they remain only crude diagrams, useful, I hope, to give greater clearness to my descriptions of what I saw, but not to be in any way trusted outside this object.* In the first place I wish to describe movement; this is, of course, quite absent from the diagrams. But, further, to make them simple, I have used a photograph of one blade only of the terebra. In the absence of movement, this is unimportant; some day, perhaps, some one may secure a cinematographic film of the whole operation.

The diagrams are magnified about 18 diameters.

Pl. XIII, figs. 1, 2, 3, and 4, attempt to show the progress of the terebra into the substance of the leaf immediately below the upper cuticle and practically at right angles to the margin of the leaf. The whole incision so made is just so much wider than the width of the terebra, as the tip of the saw curls round the end of the guide and so cuts a fraction beyond its margin.

Direct movement into the leaf ceasing, the terebra then moves forward as shown in

Fig. 5, until it reaches the position shown in

Fig. 6, when the pocket is completed. After a short rest the laying of the eggs begins.

Pl. XIV, fig. 7. At this early stage a strip of the margin of the egg

* For example I show the pocket, so far as cut, as a blank, but, in fact, the cuticle returns to its position, and the appearance is almost the same when the pouch is formed as it was before.

appears to be laid, but as by no conjuring can the rest of the egg be between the plates of the terebra, it is evident that the egg has now no spherical form, but that the rest of it is within the body of the insect, and at this stage and the further one shown in

Fig. 8, the egg is seen to stretch along the terebra as far as the transparency of the parts allow, up to the thick opaque sheath of the terebra; in fact, into the body of the insect. In Pl. XV.—

Fig. 9, though much of the egg is within the pocket, a portion still connects this portion with some still within the insect. During all this time the egg must be in a very soft plastic condition, so as to be capable of being stretched out and moulded to suit the necessities of the position.

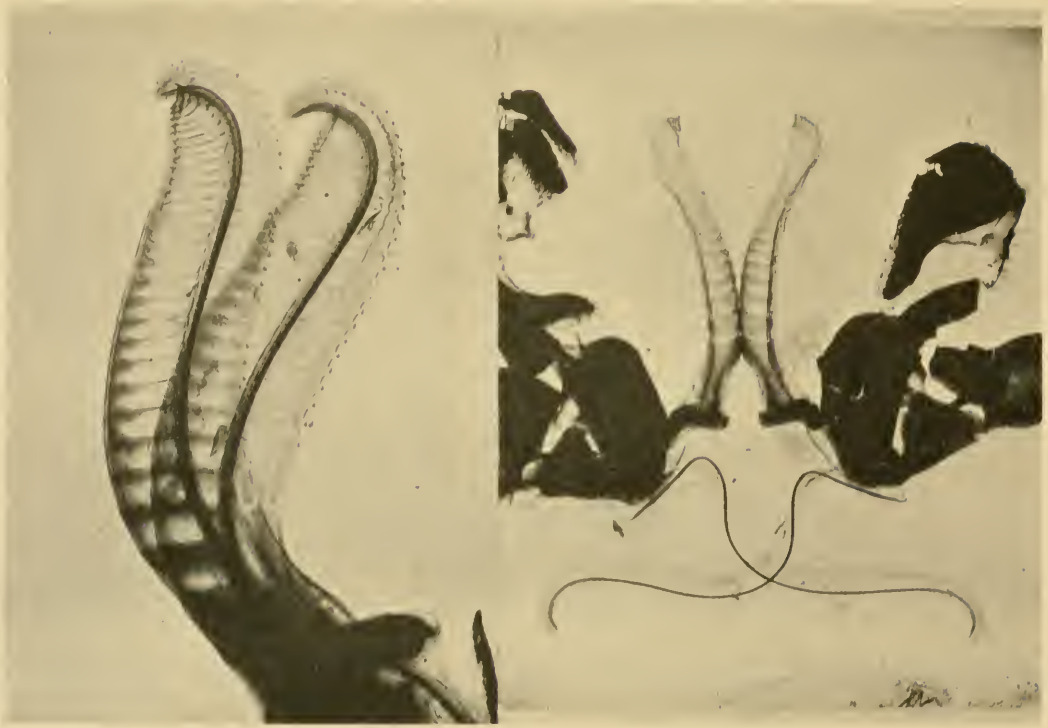
Fig. 10 shows the egg nearly all laid. As the laying is completed so the terebra descends to quite the bottom of the pocket, and with hardly any interval is withdrawn.

Pl. XVI, fig. 11 is the egg some time later (still quite diagrammatically) to show the positions taken up by the eye of the larva. Only one eye is seen, but this moves rhythmically between the two positions shown in the diagram.

Fig. 12 is a pocket after the larva has escaped (this under camera), showing the rupture by which the larva emerges, in this instance decidedly smaller than usual. This diagram is on a slightly larger scale than the others.

Photo, A. E. Tonge. *C. Hentschel.*

TRICHIOSOMA BETULETI, Costa × 3.

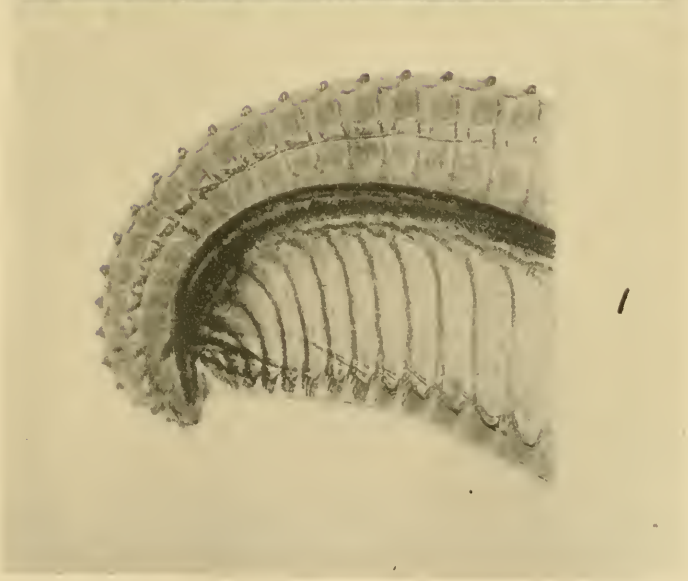


1 2

Photo, F. N. Clark. *C. Hentschel.*

1. TRICHIOSOMA BETULETI, Costa; terebra × 25.
2. „ „ ? „ × 12.

2

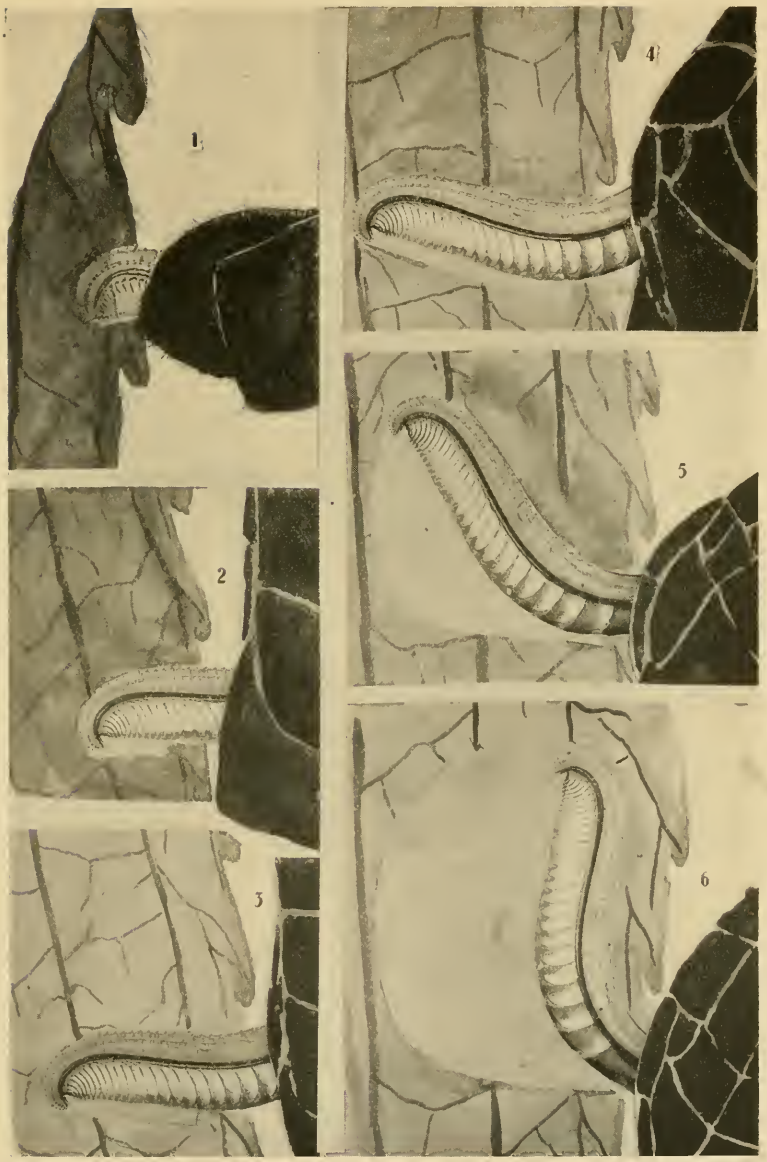


1

Photo, F. D. Morice. *C. Hentschel.*

TRICHIOSOMA BETULETI, Costa.

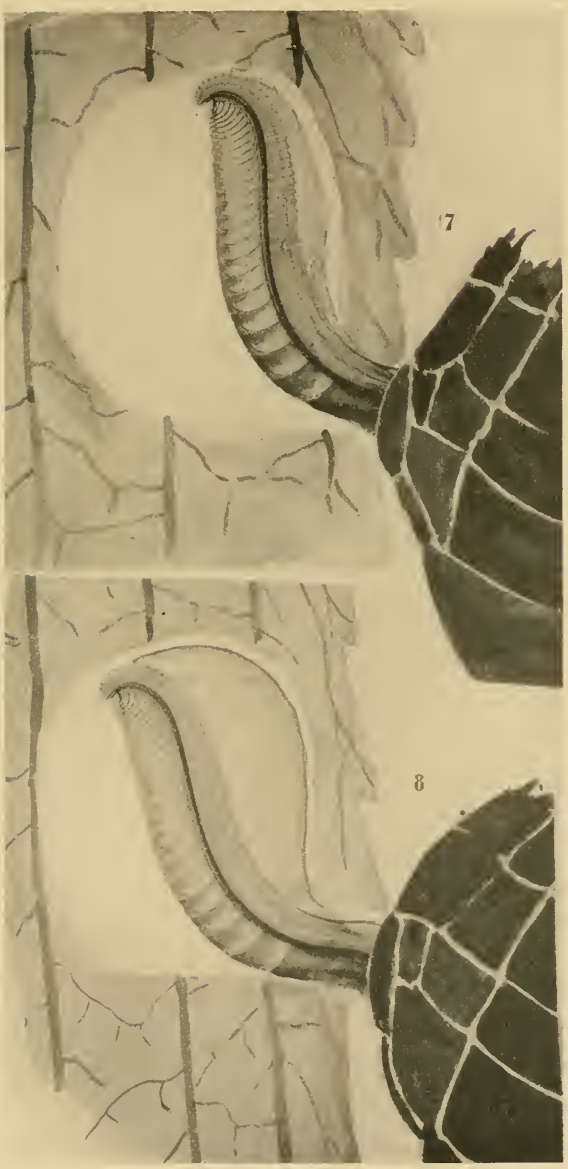
1. End of terebra × 70.
2. Margin of terebra × 250.



C. Hentschel.

TRICHIOSOMA BETULETI, Costa.

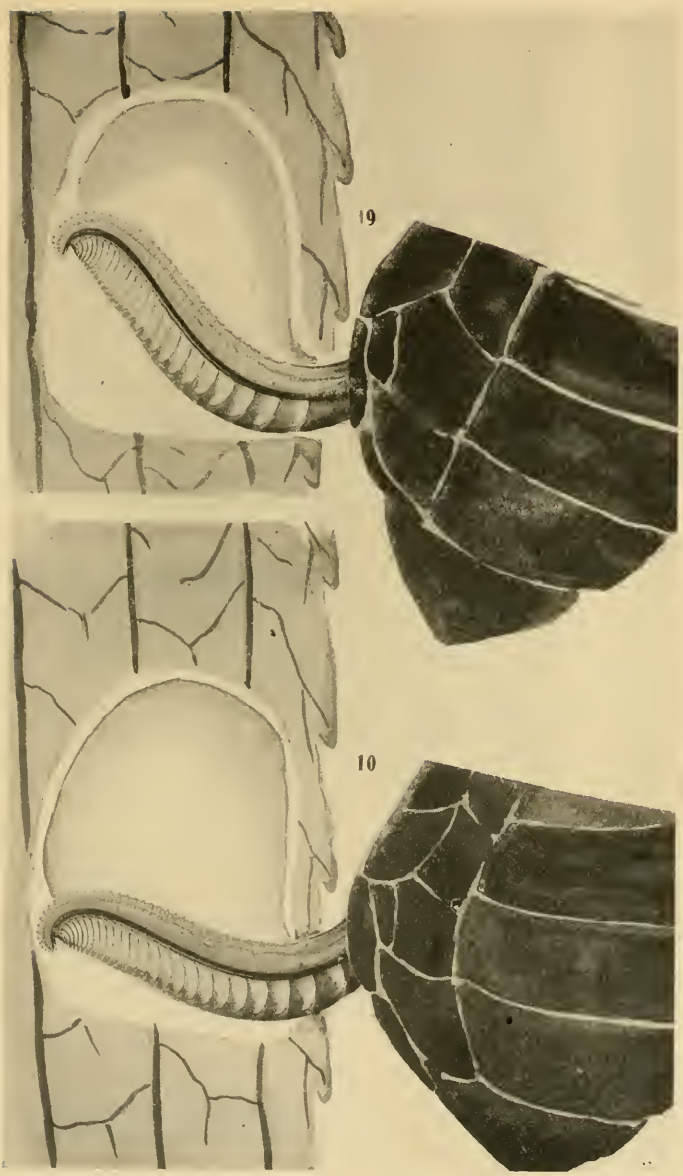
Stages in cutting the pocket.



C. Hentschel.

TRICHIOSOMA BETULETI, Costa.

Stages in laying the egg.



C. Hentschel.

TRICHIOSOMA BETULETI, Costa.

Stages in laying the egg.

C. Hentschel.

TRICHIOSOMA BETULETI, Costa.

FIG. 11.—Egg *in situ.* FIG. 12.—Pocket after hatching of larva.

VI. Culicidae *from Papua*.

By Frank H. Taylor, Entomologist to the Australian Institute of Tropical Medicine.

[Read May 7th, 1913.]

Plates XVII, XVIII.

The mosquitoes of Papua have, up to the present, received but scanty attention from collectors, only nine species being recorded.

The fact that there is so little known of Papuan mosquitoes has enabled us to describe one new genus and fourteen new species and record seven previously known forms as occurring in the Territory.

The specimens taken by Dr. Breinl were collected on the occasion of a two months' expedition during July and August, when several districts were visited.

Through the courtesy of Dr. Giblin we obtained a collection in a perfect state of preservation; these mosquitoes were collected by him whilst Medical Officer at the Lakekamu Gold Fields.

We are greatly indebted to Dr. Giblin for presenting this interesting collection to the Institute.

Some of the specimens obtained by Dr. Breinl were bred from larvae.

We hope, as opportunity offers, to make a complete mosquito survey of Papua.

Nyssorhynchus annulipes, Walker.
Anopheles annulipes, Walker.
,, *musivus*, Skuse.
,, *musicus*, Giles.

Ins. Saund., I, p. 433 (1850); Skuse, Proc. Linn. Soc. N.S. Wales, III, 2nd series, p. 1754 (1888); Giles, Handbook, Gnats, 2nd ed., p. 313 (1902); Theobald, Mon. Culicid., I, p. 164 (1903); III, p. 104 (1903); IV, p. 97 (1907); V, p. 57 (1910); Taylor, Bull. 1. Nor. Terr. Rep. p. 55 (1912).

Additional Localities. Papua, Lakekamu Gold Field (*Dr. Giblin*), Mekeo District (*Dr. Breinl*).

Cellia punctulata, Dönitz.
Anopheles punctulatus, Dönitz.
,, *tessellatum* (*nom. nud.*), Theobald.
Myzomyia punctulata, Dönitz—Giles.
Nyssorhynchus punctulatus, Dönitz—Blanchard.

Insekten-Borse, XVIII, p. 372 (1901); Theobald, Mon. Culicid., I, p. 175 (1901); Giles, Handbook, Gnats, 2nd ed., p. 287 (1902); Giles, Revis. Anop., p. 33 (1904); Blanchard, Les Moust., p. 208 (1905); Theobald, Ann. Mus. Nat. Hung., III, p. 68 (1905); Mon. Culicid., IV, p. 109 (1907); V, p. 71 (1910).

Additional Localities. Papua, Mekeo District (*Dr. Breinl*), Lakekamu Gold Field (*Dr. Giblin*).

Time of Capture. Mekeo District, August 1912, Lakekamu, 18/10/10.

Observations. The thoracic markings of this species are somewhat variable, but the position of the dark patches of scales and the fork-cells remain constant.

Neosquamomyia, n. g.

Head clothed with flat and upright forked scales; clypeus with loosely applied large broad scales; palpi longer than the proboscis, of ♀ about one-fifth as long; proboscis slender, not as long as body.

Thorax with narrow curved scales, broad flat and narrow curved ones on the prothoracic lobes; scutellum with flat scales and narrow curved ones at the base of the lobes. Wings with the first submarginal cell longer than the second posterior cell. Abdomen clothed with large closely applied flat scales.

This forms a very distinct and marked genus easily recognised by its scaled clypeus and long ♂ palpi. The ♂ genitalia are also peculiar, the basal lobes and claspers each possessing a comb composed of very stout teeth.

Neosquamomyia breinli, n. sp.

(Plate XVII, figs. 1–3.)

Head dark brown. Thorax dark brown with narrow curved scales. Abdomen black. Legs black, unbanded.

♀. Head dark brown densely clothed with flat brown scales (with a steel-blue lustre in some lights), a fringe of large white flat scales round the eyes expanding laterally into a patch, a short narrow line of flat white ones on the occiput, and black upright forked ones on the nape; eyes black with a thin fringe of black

chaetae bordering them with two projecting between the eyes; clypeus blackish with large broad white loosely applied flat scales; proboscis clothed with small black scales, slightly hairy; palpi light brown clothed with black scales and a few fairly long dark brown chaetae to the first and second segments, three-jointed, the second longer than the first and third together, apical segment very small and nipple-like; antennae blackish brown, fourteen-jointed, with long black verticillate hairs and fairly densely covered with short hairs on the internodes, basal half of second segment pale, basal lobe brown covered with small dark scales on inner edge and pure white ones beneath.

Thorax brown clothed with dark brown narrow curved scales, anterior margin with a thin border of pure white narrow curved scales and dusky brown bristles, prealar bristles black, fairly dense above the roots of the wings, a patch of white spindle-shaped scales above the roots of the wings; prothoracic lobes prominent, brown, clothed with brown narrow curved scales and white flat ones with a few dusky brown bristles; scutellum brown clothed with dusky flat scales and a few narrow curved ones at the base of the lobes, mid lobe with six brown posterior border bristles, lateral lobes with seven; metanotum brown.

Abdomen pale brown clothed with blackish scales, first segment with numerous fairly long brown hairs, posterior border hairs short, brown, those on the lateral edges of the fifth and sixth segments moderately long and conspicuous, seventh segment with an apical band of white scales, eighth with a few grey scales, last two segments with numerous light brown hairs, segments three to seven with white lateral spots; venter, first segment white scaled, segments two to five white scaled with apical blackish brown bands expanding laterally, segments six and seven white with apical and basal blackish brown banding, last two segments creamy yellow, segments six to apex fairly densely clothed with brownish hairs.

Legs black, with steel blue reflections in some lights; coxae and trochanters yellowish brown with numerous closely applied flat white scales, the former with a line of brown chaetae; femora densely clothed with white flat scales beneath; fore and mid ungues unequal, each with a small tooth, hind equal, each uniserrate.

Wings with the costa black, veins clothed with blackish scales, border scales lanceolate and linear, median flat; first fork-cell longer and narrower than the second fork-cell, base of the latter nearer the base of the wing than that of the former; stem of the first fork-cell about three-quarters the length of the cell, that of the second fork-cell almost as long as its cell; posterior cross-vein scarcely longer than the mid and nearly its own length distant

from it. Halteres with basal half of stalk creamy white, remainder black scaled.

Length 6 mm.

♂. Similar to ♀. Antennae plumose, about two-thirds as long as the proboscis, fifteen-jointed, segments three to thirteen with apical half pale, basal half and the whole of the last two segments brown, the apical segment with long dark brown basal hairs, penultimate segment with the basal third nude; palpi longer than proboscis, four-jointed, second very long, third and fourth with short sparse hairs on the inner margin, longer on the third, apical segment with two fairly long apical chaetae; proboscis slightly more hairy than in the ♀; abdomen with venter densely clothed with hairs; genitalia heavily clothed with dark brown hairs; the basal lobes bear, towards the centre of their inner margin, a small comb composed of strong brown, blunt chitinous teeth, which become gradually shorter towards the posterior end of the lobe; the apical half of the clasper also bears a similar comb in which the teeth gradually increase in length towards the apex of the clasper; wings not as densely scaled as in the ♀; ungues of fore legs very unequal, the smaller thin, the larger stout, about twice the length of the smaller, with a fairly large tooth, mid ungues unequal, slight, each with a small tooth, hind equal and rather small, the inner with a small tooth.

Length 5·5 mm.

Habitat. Papua, Milne Bay (*Dr. Breinl*), Mungana (*Dr. Giblin*).

Time of Capture. July (Milne Bay), 2/7/10 (Mungana).

Observations. Described from ♂ and ♀ specimens bred by Dr. Breinl from larvae taken from pools and hollow logs in the vicinity of native villages. It is a very marked species, easily distinguished by the scaled clypeus, long ♂ palpi, and the ungues of ♀.

Stegomyia fasciata, Fabricius.

Syst. Antliatorum, 36, 13 (1805); Rob. Desvoidy, Mem. Soc. d'Hist. Nat. d. Paris, III, p. 406, 14; p. 407; p. 408 25 (1827); Theobald, Mon. Culicid., V, p. 158 (1910).

Habitat. Papua, Milne Bay.

Time of Capture. July 1912.

Stegomyia scutellaris, Walker.

Culex scutellaris, Walker.
,, *variegatus*, Doleschall (*nec* Schrank).
,, *albopictus*, Skuse.

Journ. Proc. Linn. Soc., London, III, p. 77 (1859); Doleschall, Naturg. Tijds., V, Ned. Ind., XVII, p. 77 (1858); Skuse, Ind. Mus. Notes, III, p. 5, 20 (1895); Theobald, Mon. Culicid., V, p. 155 (1910).

Habitat. Papua, Lakekamu Gold Field (*Dr. Giblin*).

Stegomyia ornata, n. sp.

Head black, clothed with iridescent scales and black upright forked ones. Thorax yellowish brown. Abdomen pale brown, unbanded. Legs brown, black, scaled.

♂. Head black with flat black iridescent scales, azure blue in some lights, and numerous black upright forked ones; eyes black, border bristles dark brown, two bristles projecting over the eyes from the centre; antennae brown, with a pale apical ring to the segments, except the second and last two segments, basal lobe testaceous; clypeus brownish; palpi black scaled; proboscis black, long and slender, unbanded.

Thorax yellowish tinged with brown, clothed with brown narrow curved hair-like scales with a few brown flat ones over the wing roots; scutellum yellowish, paler than the thorax, clothed with brown flat scales; metanotum dark brown; prothoracic lobes yellowish, prominent, clothed with brown flat scales and a few brown hairs; pleurae yellow with a brown patch above the coxae, a few scattered white flat scales on the brown area.

Abdomen yellowish brown clothed with dusky brown scales, penultimate segment brown with its apex and last segment fairly densely covered with pale hairs; venter darker than dorsal surface covered with blackish brown scales.

Legs brownish, unbanded, clothed with black iridescent scales, violet in some lights; fore ungues unequal, the larger moderately stout with a strong tooth, mid and hind wanting.

Wings with the veins clothed with dark scales, the lateral ones rather broad; first fork-cell scarcely longer and slightly narrower than the second, base of the latter nearer the base of the wing; stem of first fork-cell about three-quarters the length of its cell; stem of the second about two-thirds the length of its cell; mid cross-vein parallel to the posterior cross-vein, the latter longer than and about one and a half times its own length distant from the former. Halteres with the stalk and knob black.

Length 4·5 mm.

Habitat. Papua, Milne Bay.

Observation. Described from a single specimen taken by

Dr. Breinl. It would come after *S. argenteopunctata*, Theobald, in his table of species.*

Stegomyia atra, n. sp.

(Plate XVII, fig. 4.)

Head black with black flat scales. Thorax black with brown spindle-shaped scales; scutellum grey scaled; pleurae with dense pure white scales. Legs black.

♀. Head black, covered with black flat scales (grey in some lights) and a patch of creamy white upright forked ones in the centre of the base and black ones on each side with a narrow border of white flat ones round the eyes expanding laterally; eyes black, fringe dusky brown with two brown bristles overhanging the eyes from the centre; antennae brown, covered with grey pile, second and third segments swollen, the second more so than the third, densely clothed with dusky pile, basal lobe black with apical half grey; clypeus black with the apical half grey; palpi densely clothed with closely applied black scales, apical third pale scaled above.

Thorax black, clothed with brown and black spindle-shaped scales with a median patch on the anterior border of mixed white narrow curved and spindle-shaped scales, and a border of dusky brown bristles; prothoracic lobes prominent, black, clothed with narrow curved flat white scales and dark brown bristles, a lateral row of dark brown bristles densest above the wing roots; scutellum dark brown with a narrow black basal edge clothed with pale brown flat scales, in some lights they are mostly blue-black; pleurae brown entirely covered with densely packed pure white flat scales.

Abdomen light brown, densely clothed with blue black flat scales, unbanded, posterior border bristles pale, very short, those on last two segments brown, long and dense, the first segment with numerous fairly long pale bristles in addition to the blue black scales; venter densely clothed with white flat scales.

Legs: coxae and trochanters light brown; femora white scaled beneath nearly the whole length, blue-black above; tibiae and tarsi of fore, mid and hind legs clothed with blue-black scales with violet reflections except tarsi three to five of mid and hind legs which are brownish with yellowish reflections; ungues equal and simple.

Wings with the veins covered with dark brown scales, the costa blue black; fringe brown; veins clothed with lanceolate and flat scales; first fork-cell longer and narrower than the second, base of

* Theobald, Mon. Culicid, V, 144 (1910).

the former nearer the base of the wing than that of the latter; stem of the first fork-cell one-third the length of the cell, stem of the second about half the length of its cell; posterior cross-vein longer than the mid cross-vein and about twice its own length distant from the mid; base of the marginal cell comparatively broad; second incrassation (Austen's sixth vein) very distinct. Halteres with base of stem fuscous, rest clothed with blue black scales.

Length 4·5–5·5 mm.

Habitat. Papua, Lakekamu Gold Field, Mungana.

Time of Capture. 29/6/10 (Mungana).

Observations. Described from three ♀ specimens taken by Dr. Giblin. It is a very distinct species owing to the absence of abdominal and leg banding.*

Scutomyia notoscripta, Skuse.

Proc. Linn. Soc. N.S. Wales, III, 2nd series, p. 1738 (1888); Theobald, Mon. Culicid., I, p. 286 (1901); III, p. 145 (1903); IV, p. 198 (1907); Bancroft, Ann. Q. Mus., No. 8, p. 24 (1908).

Habitat. Papua, Milne Bay.

Time of Capture. July 1912.

Observations. These specimens agree with Skuse's type in all details. The ungues of the mid legs are uniserrate in this species and not simple as stated by Theobald.

Lepidotomyia lineatus, n. sp.

Head with flat scales all over and narrow curved scales bordering the eyes. Thorax black clothed with narrow curved scales. Abdomen with median bands to the segments. Legs unbanded.

♀. Head black covered with flat brown scales with a median line and lateral patches of creamy flat ones, a narrow fringe of narrow curved ones bordering the eyes, border bristles dark brown, two golden yellow ones overhanging the eyes from the centre; eyes black, purple tinted; clypeus black; palpi black scaled and with short black hairs; proboscis slender, clothed with dusky brown scales; antennae brown, clothed with whitish pile, verticillate

* It has been suggested to me, since the above was written, that this insect is most probably *Skusea similis*, Theobald. In *S. similis, inter alia,* the scutellum is clothed with *narrow-curved* scales, while in *S. atra* it is entirely clothed with *flat ones.* A sufficient character to render the two insects distinct. The abdomen of *S. similis* possesses median white lateral spots, in *S. atra* it is devoid of all ornamentation.

hairs dark brown, second segment basally yellow, long, about one and a half times as long as the third segment, basal lobe dull golden yellow.

Thorax dark brown, paler above the prothoracic lobes, densely clothed with brown narrow-curved hair-like scales mixed with a few scattered yellowish ones on the posterior end; a median and two lateral lines (one on each side) of golden yellow narrow curved hair-like scales extending the whole length of the thorax, a lateral border of golden bristles dense in front of and above the roots of the wings; prothoracic lobes prominent, brown densely clothed with golden bristles; scutellum clothed with narrow curved brown scales, the mid lobe black, lateral lobes brown, mid lobe with five brown border bristles and lateral lobes with seven, four in front and three behind.

Abdomen black, clothed with densely applied dusky brown scales, first segment clothed with numerous brown bristles in addition, second segment with basal, lateral and median pale creamy white spots with a few scattered basal pale scales, segments three to six with white median bands, on segments two and three the centre of the bands is produced into a conspicuous patch, segment seven with a broad median lateral patch; posterior border bristles pale and short; venter fairly densely covered with short pale hairs with second segment densely covered with white scales, segments three to seven white-scaled with apical brown bands, penultimate and apical segments brown scaled.

Legs black, coxae and trochanters brown, femora white scaled beneath, tarsi of fore, mid and hind legs black except fifth tarsi of hind legs which are dark brown; ungues of fore, mid and hind legs equal and simple.

Wings with the costa, subcostal and first longitudinal veins covered with blue black scales with violet reflections, remaining veins clothed with short brown lateral lanceolate and small median broad scales; first fork-cell longer and narrower than the second, base of the former slightly nearer the base of the wing than that of the latter; stem of the first fork-cell half the length of its cell, stem of the second about two-thirds the length of the cell; posterior cross-vein longer than the mid cross-vein and about its own length distant from it; second and third incrassations fairly distinct. The wing has a naked appearance on account of the smallness of the vein scales. Halteres, stem yellowish brown, knob dusky.

Length 5 mm.

Habitat. Papua, Lakekamu Gold Field and Mekeo District.

Observations. Described from specimens taken by Dr. Giblin and Dr. Breinl.

It is easily distinguished from *L. magna*, Theobald, by the absence of the white scales on the mesonotum and the leg banding.

The wing venation, the squamose character of the head, *inter alia*, are sufficient to separate this insect from undoubted specimens of *Skusea funerea*, Theob., in the collections of the Australian Institute of Tropical Medicine.

Leucomyia australiensis, Theobald.

var. *papuensis*, var. nov.

(Plate XVII, fig. 5.)

Head brown, with scattered brown and pale scales and black upright forked ones; proboscis brown. Thorax ochraceous, the front two-thirds with silvery white scales, the third with brown ones. Abdomen with deep brown scales and basal banding to some of the segments. Legs black scaled and basal banding to hind tarsi. Wings with dark brown scales.

♀. Head brown with scattered brown and creamy narrow curved scales and black upright forked ones, a patch of white narrow curved ones in the centre extending between the eyes; eyes black with a thin fringe of brown hairs overhanging them; antennae dark brown clothed with fairly dense short brown pile; palpi clothed with black scales; proboscis black scaled; clypeus black.

Thorax ochraceous with the front two-thirds densely clothed with white narrow curved scales, the hind third with brown narrow curved ones and a narrow edge of brown ones to the sides, a row of dense dark brown hairs on the sides extending from the scutellum to mid-way between the wing roots and the prothoracic lobes, the latter with narrow curved brown scales and numerous brown hairs; scutellum ochraceous with brown narrow curved scales (pale in some lights); metanotum ochraceous: pleurae brownish with patches of white flat scales.

Abdomen brownish black scaled with violet tints in some lights, and white basal banding to most of the segments; first segment brown scaled with golden brown chaetae; segments two to five with white basal banding, segments six and seven with white lateral patches; penultimate and apical segments black scaled, posterior border bristles pale golden brown; segments two to seven with white lateral spots; venter brown scaled; segments five to eight with white lateral patches, the patch on eighth segment the

smallest, a few scattered pale golden bristles mostly on the lateral edges.

Legs black; femora pale scaled beneath, coxae and trochanters ochraceous; knee joint pale; first and second tarsi of fore legs with narrow white basal bands; first to third tarsi of mid legs with white basal banding; tarsi of hind legs with broad white basal banding; ungues of fore and mid legs equal each with a small tooth; hind ungues equal and simple, straighter than those of fore and mid legs.

Wings with the veins covered with dark brown scales, lateral ones linear, median small and flat; costa black; first fork-cell narrower and scarcely longer than the second fork-cell, base of the latter nearer the base of the wing than that of the first fork-cell, stem of the latter about three-quarters the length of its cell, that of second fork-cell about half the length of its cell; mid cross-vein longer than the supernumerary, the posterior as long as the mid, sloping forwards and about half its length distant from it; fringe brown. Halteres, the stalk pale with the knob black scaled.

Length 5 mm.

Habitat. Papua, Milne Bay (*Dr. Breinl*).

The above mosquito differs from *L. australiensis*, Theob., mainly in the leg banding, wing venation and the absence of mottled scales on the wing. Until further material comes to hand it is proposed to retain it as a variety of *L. australiensis*, Theobald.

Leucomyia? albitarsis, n. sp.

Head brown. Thorax brown with mostly brown scales. Abdomen dark brown scaled with basal banding and lateral white spots. Legs dusky brown with basal white banding.

♀. Head brown, clothed with white narrow curved scales in the centre and brown narrow curved and flat white ones on the sides, with numerous black upright forked ones at the sides and on the nape, and dark brown frontal chaetae; antennae brown with dark brown verticillate hairs and whitish pubescence to the internodes, basal lobe and basal half of second segment yellowish brown; palpi pale clothed with dark brown scales; clypeus dark brown; proboscis black scaled.

Thorax brown clothed with narrow curved brown hair-like scales and a median line of pure white ones extending from the anterior margin to the level of the roots of the wings, a lateral border of brown bristles on each side of mesothorax, densest above the roots of the wings; scutellum brown clothed with white narrow curved

scales, the base of the mid lobe clothed with brown narrow curved ones with six dark brown posterior border bristles to the mid lobe, and four to the lateral lobes; prothoracic lobes brown clothed with *white flat* scales and brown bristles; pleurae brown clothed with patches of flat white scales and scattered brown bristles; metanotum light brown.

Legs black scaled; coxae and trochanters pale brown with a patch of white flat scales to each coxa; fore femora brown scaled, a narrow line of white scales beneath, femora of mid and hind legs black scaled with the basal half white scaled beneath, fore, mid, and hind femora each with a narrow basal white band; tibiae black scaled; first and second tarsi of fore and mid legs basally banded white, remaining tarsi black scaled, first to fourth tarsals with white basal banding, fifth black scaled; ungues of fore, mid and hind legs equal, uniserrate.

Abdomen black scaled; first segment clothed with numerous brown bristles with a patch of brown scales in the middle of which is a narrow line of pale ones; segments two to five basally banded white; segments three to seven with lateral white basal patches, penultimate and apical segments black; venter dark scales with basal white banding.

Wings with the veins covered with brown scales; the costa and first longitudinal vein black; fringe brown; first fork-cell longer and narrower than the second, base of the latter nearer the base of the wing than that of the former; stem of the first fork-cell about the length of its cell, stem of the second nearly the length of the cell; mid cross-vein longer than the posterior cross-vein, the latter about half its own length distant from the former and nearer the apex of the wing than the mid cross-vein. Halteres stems creamy yellow, knobs dusky with a few small white flat scales.

Length 4·5 mm.

Habitat. Papua, Lakekamu Gold Field.

Observations. Described from a single ♀ taken by Dr. Giblin. Though not entirely agreeing with the generic description it was thought best to place it in the genus *Leucomyia* for the present. It is easily recognised by its thoracic markings and the position of the posterior cross-vein.

Culicelsa vigilax, Skuse.

Culex vigilax, Skuse (*nec* Theobald).
,, *marinus*, Theobald.

Proc. Linn. Soc. N.S. Wales, III, 2nd series, p. 1731 (1888); Theobald, Mon. Culicid., I, p. 369 (1901); III, p. 178 (1903); IV, p. 382 (1907); V, p. 317 (1910).

Additional Localities. Papua, Mekeo District (*Dr. Breinl*); Sabai Island, Torres Straits (*T. A. Williams*).

Culicelsa annulirostris, Skuse.

(Plate XVII, fig. 6.)

Proc. Linn. Soc. N.S. Wales, III, 2nd series, p. 1737 (1888).

Additional Locality. Papua, Lakekamu Gold Field.
Time of Capture. 20/10/10 (*Dr. Giblin*).

Culicelsa annulirostris, Skuse.

var. *milni*, var. nov.

(Plate XVIII, figs. 7–8.)

Thorax black with pale narrow scales. Abdomen with black scales, basal bands of pale creamy white. Legs with dusky brown scales, femora pale beneath.

♀. Head dark brown with creamy white narrow curved scales, a small lateral patch of flat creamy white ones and creamy yellow and brown upright forked ones at the base; antennae brown, second segment dark brown, basal lobe black; eyes purplish black with a fringe of pale yellowish hairs and a few overhanging them from the centre; palpi black scaled; proboscis black with a narrow white band in the middle, in some lights the band appears to be creamy; clypeus brown.

Thorax black densely covered with mixed creamy white and pale brown narrow curved scales with three rows of pale yellowish bristles on each side, brown above the roots of the wings; prothoracic lobes brown, prominent, with pale narrow curved scales and yellowish bristles; scutellum light brown clothed with whitish narrow curved scales with five brownish bristles to the mid lobe and three to each of the lateral lobes; metanotum brown; pleurae brown with patches of white flat scales.

Abdomen pale black scaled, truncate at apex; the base of each segment with a band of creamy white scales expanding in width towards the centre of segments two to six; posterior border bristles pale yellow; venter pale yellowish fairly densely covered with yellowish hairs and with black scales with broad white basal bands which expand laterally, last two segments unbanded, the penultimate with white lateral spots.

Legs: coxae and trochanters pale brown clothed with white scales; femora black scaled above, mottled with brown and white scales beneath, the latter predominating; knee joint creamy; tibiae black scaled with a narrow apical creamy white band; tarsi black scaled first and second of fore legs basally banded white with a trace of banding on the third, first three of mid and hind legs basally banded white; ungues equal and simple.

Wings densely covered with blackish scales; costa black; first fork-cell longer and narrower than the second, the base of the latter slightly nearer the base of the wing than that of the former; stem of first fork-cell about two-thirds the length of its cell, that of second fork-cell a little more than half the length of its cell; mid cross-vein longer than the posterior cross-vein, the latter sloping forwards and about twice its length distant from the mid cross; fringe dusky. Halteres with pale stem and dusky knob.

Length 4·5 mm.

♂. Head dark brown with white narrow curved and brown upright forked scales and flat white ones on the sides; eyes black, fringe dark brown; antennae pale, plumes black with the nodes dark brown, basal lobes brown, penultimate and apical segments brown, very long about half the length of the whole; palpi longer than the proboscis densely covered with black hairs from the apical third of first joint, black scaled, first joint with a band of creamy white scales at the base of the apical third, second and apical joints basally banded creamy white the last joint apically banded also; proboscis black scaled with a narrow white scaled band a little in front of the middle. Abdomen with banding less distinct than in the ♀, scales blacker; venter densely covered with pale brown hairs; wings similar to ♀ but less densely scaled; first fork-cell longer and narrower than the second, stem of the former nearly as long as the cell, that of the latter about two-thirds the length of its cell; posterior cross-vein longer than the mid and twice its own length distant from it. Ungues of fore and mid legs very unequal, uniserrate, hind equal and simple.

Length 4 mm.

Habitat. Papua, Milne Bay (*Dr. Breinl*).

Culex fatigans, Wiedemann.

Auss. Zweiflug. Ins., 10 (1828); Theobald, Mon. Culicid., II, p. 151 (1901); V, p. 383 (1910).

Additional Locality. Papua, Port Moresby (*Dr. Breinl*).

Observations. The collection contained a single perfect

♂ specimen. It is the first record of its presence in British New Guinea.

For additional references and synonomy see Theobald, *l. c.*

Pseudotaeniorhynchus conopas, Frauenf.

var. *giblini*, var. nov.

Head yellow. Thorax with black spots and lateral patches on the posterior half with golden yellow narrow curved scales. Abdomen brownish. Legs banded.

♀. Head brown; densely clothed with golden yellow narrow curved and upright forked scales with a narrow line of flat ones on the sides bordering the eyes; eyes black with red reflections, border bristles yellow, two overhanging the eyes from the centre; antennae light brown densely clothed with whitish pubescence, verticillate hairs brown, basal lobes and second segment orange yellow, the former slightly the darker; palpi bright orange yellow with brown hairs; proboscis orange yellow with the tip black; clypeus yellowish brown.

Thorax fuscous densely covered with narrow curved hair-like golden yellow scales with six rows of golden yellow bristles, the lateral rows especially dense over the roots of the wings, on the posterior half of thorax extending towards the scutellum is a U-shaped blackish brown area with the open end facing the scutellum, the latter lemon yellow (in one specimen it is orange yellow) with narrow curved golden scales to the mid lobe, lateral lobes black, nude, mid lobe with five yellow posterior border bristles, the lateral lobes with a double row, four in front and three behind; pleurae mottled with light and dark brown with a few pale creamy scales and golden bristles (most of the scales seem to have been rubbed off); metanotum bright yellow.

Abdomen brown densely covered with rich orange yellow scales, lateral bristles prominent, posterior border bristles golden; the first segment greyish densely clothed with golden yellow bristles and a patch of orange yellow scales in the centre; venter brown with orange yellow scales and densely covered with yellowish hairs.

Legs golden yellow scaled; coxae and trochanters pale yellow; femora and tibiae orange yellow the latter in the fore and mid legs with pale violet brown spots, in the hind legs with violet brown bands; tarsi golden yellow with apical violet brown bands, the fifth tarsals of fore and mid legs appear to be only spotted; ungues equal, simple, and sickle-shaped.

Wings with the veins covered with golden yellow thick elongated scales mostly ending diagonally and convexly; first fork-cell about same length and narrower than the second, base of the latter much

nearer the base of the wing than that of the former; posterior cross-vein about as long as the mid cross and about one and a half times its own length distant from the mid cross; fringe golden yellow; halteres with the stem pale yellow and knob darker.

Length 5·5 to 6 mm.

♂. Head pale yellowish brown, scales paler than in the ♀; antennae pale, nodes brown, penultimate and apical segments brown moderately long, basal lobes orange yellow, plumes brown with their base orange coloured; palpi longer than proboscis, orange yellow with the penultimate and apical segments violet-brown scaled, apex of ante-penultimate, penultimate and apical segments with fairly long orange yellow hairs; proboscis golden yellow with apex dusky.

Thorax with a blackish-brown ⊔-shaped area covering most of the thorax, the rest lemon yellow, fairly densely clothed with bright lemon yellow narrow curved hair-like scales; scutellum lemon yellow covered with golden yellow narrow curved scales, lateral lobes black, four posterior border bristles to mid lobe and five to lateral lobes three in front and two behind; pleurae mottled with lemon yellow and brown with scattered pale scales and golden hairs; metanotum brown.

Abdomen pale covered with orange yellow scales and with golden yellow posterior border bristles, with a few violet brown scales in the centre towards the apex on most of the segments, first segment greyish with numerous golden yellow bristles and a small patch of golden scales in the centre, segments five to seven with apical lateral nude brown patches; lateral border bristles dense, yellow, apical segment densely covered with golden hairs; venter clothed with orange yellow scales, densely covered with golden hairs, the character of the genitals could not be correctly observed owing to the dense hairy clothing.

Legs similar to ♀; ungues of fore and mid legs unequal, the larger with two teeth, the smaller simple, hind ones missing.

Wings with the costa and subcostal vein with golden scales, scales on remaining veins pale dusky brown; fringe pale; first fork-cell longer and narrower than the second, the base of the latter nearer the base of the wing than that of the former; stem of the first fork-cell about seven-eighths the length of its cell, that of the second about five-sevenths the length of the cell; posterior cross-vein longer than the mid cross-vein and about twice its own length distant from it. Halteres with pale stem and darker knob.

Length 5·5. mm.

Habitat. Papua, Lakekamu Gold Field (*Dr. Giblin*).

Observations. Described from three ♀ specimens and

one ♂ and dedicated to its discoverer. It is a very handsome variety, easily recognised by the thoracic and leg ornamentations. The wing clothing of the ♂ is different to that of the ♀; the ground colour of the thorax also shows some variations.

Chrysoconops brevicellulus, Theobald.
Taeniorhynchus brevicellulus, Theobald.

(Plate XVIII, fig. 9.)

Theobald, Mon. Culicid., II, p. 212 (1901), III, p. 268 (1903); IV, p. 492 (1907); Rec. Ind. Mus., II, pt. III, No. 30, p. 300 (1908); Mon. Culicid., V, p. 438 (1910); Summers, Ann. & Mag. Nat. Hist. 10, No. 56, 223 (1912).

Additional Locality. Papua, Lakekamu Gold Field (*Dr. Giblin*).

Taeniorhynchus septempunctata, Theobald.
Mansonia septempunctata, Theobald.

Theobald, Ann. Mus. Nat. Hung., III, p. 187 (1905); Mon. Culicid., IV, p. 494 (1907); V, p. 448 (1910).

Additional Localities. Papua, Lakekamu Gold Field (*Dr. Giblin*), Mekeo District (*Dr. Breinl*).

Taeniorhynchus uniformis, Theobald.

Mansonia uniformis, Theobald.
Panoplites uniformis, Theobald.
Panoplites australiensis, Giles.

Theobald, Mon. Culicid., II, p. 180 (1901); Giles, Handbook, Gnats, 2nd ed., 355 (1903); Blanchard, Les Moust., p. 379 (1905); Neven-Lemaire, Archiv. Parasitologie, 10, p. 266 (1906–7).

Additional Localities. Papua, Lakekamu Gold Field (*Dr. Giblin*); Milne Bay (*Dr. Breinl*).

Taeniorhynchus papuensis, n. sp.

Palpi brown scaled; proboscis yellowish brown with apical third deep black. Thorax brown. Abdomen dark brown, dark brown scaled. Legs unbanded. Wings not mottled.

♀. Head brown with pale creamy narrow curved scales and flat creamy ones on the sides with numerous dusky brown upright

forked ones over the whole head; eyes purple black, fringe scanty, brown; antennae brown with very fine pile, verticillate hairs brown; proboscis yellowish with basal half covered with loosely applied brown scales, apical to the basal half is a distinct narrow yellowish band, the rest black; palpi pale, covered with brown scales; clypeus brown.

Thorax dark brown, somewhat denuded, covered with yellowish brown narrow curved scales, a lateral row of dusky brown bristles extending from the scutellum to the roots of the wings and two short rows in front of the scutellum; prothoracic lobes brown, fairly prominent with a few long and numerous short brown hairs (no scales could be seen); pleurae yellowish (almost denuded) with a few creamy flat scales; scutellum brown with yellowish brown narrow curved scales with four dusky brown bristles to the mid lobe and five to the lateral lobes, three in front and two behind; metanotum brown.

Abdomen dark brown, truncate, covered with brown scales, posterior border bristles golden yellow with brown lateral bristles, segments three to five with apical lateral creamy spots, not so prominent on the fifth; venter covered with pale ochraceous scales and short yellowish hairs.

Legs brown scaled; femora and tibiae with three patches of pale equidistant ochraceous scales; ungues equal and simple.

Wings with the veins covered with brown scales; costa dusky brown; fringe pale brown; first fork-cell longer and narrower than the second, the base of the latter slightly nearer the base of the wing; stem of the first fork-cell about half the length of its cell, stem of the second about one-third the length of the cell; posterior cross-vein longer than the mid and twice its own length distant from it. Halteres with stem creamy and knob brownish.

Length 3·5 mm.

Habitat. Lakekamu Gold Field.

Observations. Described from four specimens taken by Dr. Giblin.

Melanoconion papuensis, n. sp.

Head densely clothed with narrow curved and upright forked scales. Thorax brown. Abdomen densely clothed with brown scales. Legs dark brown.

♀. Head brown densely clothed with light brown narrow curved hair-like scales, pale upright forked ones in the centre and dark ones on the sides, a narrow border of flat white ones at the sides round the eyes, the latter purple black, border fringe pale brown; antennae

brown, verticillate hairs dark brown, internodes densely covered with pale pubescence, second segment clothed with short dark brown hairs, basal lobes yellowish brown; clypeus pale brown; palpi dark brown scaled about one-quarter the length of the proboscis, the latter dark brown, the apex covered with short brown hairs.

Thorax dark brown densely covered with narrow curved brown hair-like scales, posterior portion of mesothorax yellowish brown; scutellum yellowish brown covered with very narrow hair-like scales, six brown border bristles to the mid lobe and four to the lateral lobes; pleurae pale yellowish brown, denuded, with a few scattered brown hairs; metanotum light brown.

Abdomen pale creamy densely clothed with brown scales; first segment pale brown with numerous fairly long brown hairs, posterior border bristles brown, lateral border bristles brown; venter pale brown scaled with numerous brown hairs.

Legs dark brown; coxae and trochanters pale yellowish brown; femora with the basal half greyish white beneath; tarsi of fore and mid legs pale brown; hind tarsi dark brown; ungues small, equal and simple.

Wings with the veins covered with very small linear lateral and median flat scales; first fork-cell longer and narrower than the second, base of the latter nearer the base of the wing than that of the former; stem of the first fork-cell slightly more than half the length of its cell; stem of the second fork-cell nearly the length of the cell; mid cross-vein longer than the posterior cross-vein, the latter about three times its own length distant from the former; fringe dark. Halteres with creamy stems and dusky knobs.

Length 4·5 mm.

Habitat. Papua, Lakekamu Gold Field.

Observations. Described from one ♀ specimen taken by Dr. Giblin. It is closely related to *M. indecorabilis*, Theob., but can easily be separated from it by its pale pleurae and pale scaled head, etc.

Finlaya poicilia, Theobald.

Mon. Culicid., III, p. 283 (1903); IV, p. 520 (1907); Giles, Journ. Trop. Med., VII, p. 366 (1904); Theobald, Gen. Ins. Culicid., p. 33 (1905); Banks, Philip. Journ. Sci., I, p. 9, 990 (1906); Ludlow, Mosq. Philip. 9 (1908).

Additional Localities. Papua, Samarai Island, Mekeo District, (*Dr. Breinl*); Lakekamu Gold Field (*Dr. Giblin*).

Skusea funerea, Theobald.

Mon. Culicid., III, p. 292 (1903); IV, 542 (1907); V, p. 488 (1910); Bancroft, Ann. Queensland Mus., No. 8, p. 55 (1908).

Additional Locality. Papua, Mekeo District (*Dr. Breinl.*)

Observations. The abdomen of the specimens are in an imperfect condition, but there can be little doubt that it is the above species as it agrees in other details.

Uranotaenia nigerrima, n. sp.

(Plate XVIII, fig. 10.)

Head brown with white scales. Thorax pale brown. Abdomen jet black. Legs dark brown scaled.

♀. Head brown with loosely applied white flat scales with numerous dark brown upright forked scales; eyes deep black; antennae deep brown, verticillate hairs blackish, pile brown; proboscis black, hairy, apex with a creamy yellow tinge; palpi black.

Thorax pale yellowish brown (in two specimens it is brown) densely clothed with brown narrow curved scales with a small median area in front of the scutellum nude, a row of brown bristles extending from the roots of the wings to the scutellum; prothoracic lobes brown clothed with flat pale scales and brown bristles; scutellum pale brown clothed with flat brown scales; metanotum brown; pleurae yellowish with a central brown patch.

Abdomen pitchy black, unbanded, truncate; venter black.

Legs brownish black; coxae and trochanters yellowish; femora pale beneath, fore femora swollen; ungues equal and simple.

Wings with the veins covered with dusky brown scales; costa black; fringe dusky; first submarginal cell three-fifths the length of the second posterior cell; stem of the former slightly more than twice the length of its cell, stem of second fork-cell about one and a half times the length of the cell; posterior cross-vein longer than the mid cross-vein and scarcely its own length distant from it. Halteres black.

Length 3 mm.

♂. Head similar to ♀; antennae pale brown, nodes blackish, plumes brown; palpi and proboscis as in ♀, last two segments of the former very long; clypeus brown.

Thorax yellowish brown, clothing as in ♀; scutellum similar to ♀ mid lobe with four black bristles to mid lobe and three to lateral lobes; metanotum chestnut brown.

Abdomen with brownish black scales, hairy at the sides; venter as in ♀.

Legs similar to ♀; fore and mid ungues unequal, simple, hind equal and simple.

Wings with scales similar to ♀; stem of first fork-cell about three times the length of its cell, stem of second fork-cell about one and a half times the length of the cell; posterior cross-vein longer and slightly more than its own length distant from the mid.

Length 3 mm.

Habitat. Papua, Milne Bay (*Dr. Breinl*); Lakekamu Gold Field (*Dr. Giblin*).

Observations. This is a very distinct species and would come next to *Uranotaenia atra*, Theobald, in his synoptic table.*

Hodgesia triangulatus, n. sp.

Head clothed with flat scales. Thorax black clothed with narrow curved hair-like scales. Abdomen dark brown scaled. Legs unbanded.

♀. Head densely covered with white flat scales except on the nape where they are brown and slightly larger, the white scales in front form a distinct triangle; eyes purplish black, fringe dusky, two dark brown bristles overhanging the eyes from the centre; antennae brown, fourteen-jointed, verticillate hairs black, pubescence on internodes grey-white, basal lobe black; palpi very short, black scaled; clypeus brown; proboscis brown slender, expanded apically, about the length of the abdomen with a few pale very short hairs on the apex.

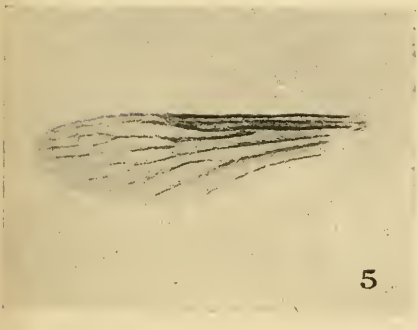
Thorax shining black clothed with dark brown narrow curved scales and two rows of dusky brown bristles; scutellum dark brown (denuded of scales), mid lobe with apparently six border bristles, lateral lobes with three; pleurae black with the remains of white small fairly broad flat scales; metanotum black.

Abdomen brown, clothed with dark brown scales, segments seven to the end black scaled, segments six and seven with fairly large apical lateral white spots, first segment with numerous brown hairs in addition to the brown scales; venter brown with pale brown scales.

Legs brown; coxae pallid; undersurfaces of femora densely clothed with creamy white scales; ungues small, equal and simple.

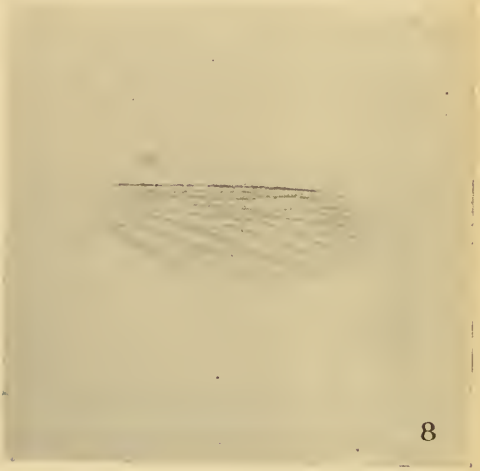
Wings about twice as long as the abdomen, with brown scales to the veins; costa, subcostal and first longitudinal veins black

* Theobald, Mon. Culicid., V, p. 500 (1910).



Photo, F. H. T. *C. Hentschel.*

PAPUAN CULICIDAE



Photo, F. H. T. *C. Hentschel.*

PAPUAN CULICIDAE.

scaled; fringe brown; the basal end of the second long vein carried well beyond the marginal transverse vein, veins clothed with very small median flat scales and short linear lateral ones with *ragged* ends, the lateral ones dense on the fork-cells; first fork-cell longer and slightly wider than the second, base of the latter nearer the base of the wing than that of the former; stems of the fork-cells about two-thirds the length of their cells; posterior cross-vein shorter than the mid cross-vein and about twice its own length from it; second incrossation well marked; halteres with yellowish stems and dusky knobs.

Length 2·5 mm.

Habitat. Papua, Lakekamu Gold Field.

Observations. Described from one ♀ specimen taken by Dr. Giblin. The scutellum was unfortunately denuded of scales. The basal end of the second long vein is very marked.

Explanation of Plates.

PLATE XVII.

Fig. 1. *Neosquamomyia breinli*, n. sp. ♂ head
2. *Neosquamomyia breinli*, n. sp. ♂ wing
3. *Neosquamomyia breinli*, n. sp. ♀ wing
4. *Stegomyia atra*, n. sp. ♀ wing
5. *Leucomyia papuensis*, n. sp. ♀ wing
6. *Culicelsa annulirostris*, Skuse ♀ wing

PLATE XVIII.

7. *Culex annulirostris*, Skuse, var. *milni*, n. var. ♂ head
8. *Culex annulirostris*, Skuse, var. *milni*, n. var. ♂ wing
9. *Chrysoconops brevicellulus*, Theob. ♀ wing
10. *Uranotaenia nigerrima*, n. sp. ♂ head

All figures × 14.

VII. *A Revision of the* Tipulid *genus* Styringomyia, *Lw.*

By F. W. Edwards, B.A.

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[Read February 4th, 1914.]

Plates XIX–XXV.

The genus *Styringomyia* is an unusually interesting one from several points of view. In the first place, several peculiarities of structure give it a most isolated position among the Tipulidae : it differs from all the other members of the family in (1) the largely developed prothorax, which is less reduced than in any other Diptera with which I am acquainted, the nearest approach being perhaps made by *Cylindrotoma*; (2) the possession of a very definite chaetotaxy of the head and thorax, a condition which is extremely rare among the Nematocera; and (3) the structure of the genital organs, especially the ovipositor of the female, which is very short and complicated in structure, and altogether unlike the ensiform organ characteristic of practically all other Tipulidae, Cylindrotominae excepted. These structural features make the genus a difficult one to place; since no allies can be pointed out it might well be removed from the Antochini (Limnobina anomala), where Osten-Sacken located it, and form a separate division of its own.

Styringomyia is also interesting from the point of view of variation, owing to its great tendency to form local species or races, but it is also noteworthy that certain species have attained a wide distribution, and occur side by side with a number of different local forms. In the notes which follow these forms have been regarded as distinct "species," because it has usually been found that even slight colour variations are accompanied by structural modifications in the genitalia, but whether these forms can interbreed in nature can only be determined by experiment, while more extensive material is required in order to decide what characters should rightly be regarded as specific.

The genus was first described by Loew (1846) from a single female specimen preserved in copal; subsequently the

same writer found a male specimen, which he regarded as representing a distinct species, in Baltic amber; this he named but did not describe in his pamphlet on the amber Diptera (" Bernstein und Bernsteinfauna," p. 38). Subsequently Osten-Sacken (1869) gave some notes on a specimen in his possession in a lump of copal from Zanzibar. These three specimens seem to be all that are known in a fossil or subfossil state, and unfortunately they all appear to be lost. Prof. Meunier informs me that he has made a number of endeavours to trace Loew's types, but always without success, and that in all the large collections of amber insects with which he is acquainted he has never met with a specimen. The genus is unrepresented in the amber collections in the British Museum, and is evidently very rare in a fossil state, a fact which suggests that its apparently primitive characters may not be such in reality.

Although Osten-Sacken (1873) mentions having met with some recent specimens in the Stockholm museum, the first living species was not described until in 1901 Grimshaw introduced his *S. didyma*. Since that time nine additional specific names have been proposed, but two of these names must be relegated to synonymy. In the present paper fifteen new species are described, bringing the total number of known forms up to twenty-three, all from the tropics of the Old World. In all probability, however, this number represents but a percentage of the species which actually exist.

Of the life-history and early stages of the members of this genus nothing is known, and the only thing recorded concerning their habits relates to the attitude of rest, which is very remarkable, resembling that adopted by the *Phasmidae*. Dr. N. Annandale, referring to some specimens of *S. ceylonica* taken at Puri, Orissa, says : " This species rests on walls with the two anterior pairs of legs stretched out straight in front and the posterior pair behind, resembling a stray piece of cobweb." The late Mr. F. W. Terry made a similar remark to the writer regarding the resting habits of *S. didyma*, and de Meijere (1911) has also recorded a statement of Jacobson's to the same effect. It is possible that the enlargement of the prothorax may have some connection with the peculiar posture adopted by the insect.

The writer wishes to express his indebtedness to the following gentlemen for assistance in the preparation of

this paper: to Mr. C. P. Alexander for the loan of the type of *S. howardi*; to Dr. N. Annandale and Mr. F. H. Gravely for the loan of the types of *S. flava* and *S. obscura* and of other specimens from the Indian Museum collection; to Dr. Günther Enderlein for the loan of the type of *S. solocipennis* and for information regarding *S. annulipes*; to Mr. P. H. Grimshaw for specimens of *S. didyma*; to Prof. J. C. H. de Meijere for the loan of all the Javan specimens here mentioned; and to Dr. Yngve Sjöstedt for the loan of the types of *S. crassicosta* and *S. sjöstedti*.

Characters of the genus Styringomyia, *Lw.*

The genus has never been fully described, and as there is very little variation in general structure among the different species, a full generic description will save much repetition in the subsequent part of this paper. It is possible that a few characters may be mentioned below which are not applicable to every species, but this has as far as possible been avoided.

Head roundish or slightly longer than broad, narrowed behind into a fairly distinct neck; the eyes separated by a broad front, and with a slightly raised tubercle between them at the base of the antennae. On the front are three pairs of strong bristles; there are two pairs of smaller bristles at the back of the eyes and a few small hairs on the occiput. *Proboscis* not more than half as long as the head. *Palpi* slightly hairy, four-jointed, the first joint not much longer than broad, the second and third a little longer than the first, and all three somewhat thicker apically; the fourth joint cylindrical, thinner than any of the others, and about half as long again as the second or third. *Antennae* sixteen-jointed, the first joint cylindrical and about two and a half times as long as broad, the second nearly round, a trifle broader in diameter than the first, the remaining joints oval, slightly decreasing in size apically; the first two joints are practically bare, the remainder bear a few stiff hairs about the middle.

Thorax. The prothorax is largely developed, the *pronotum* being divided by a transverse suture into two portions, the anterior part roughly triangular in shape and carrying a row of about ten strong bristles which project over the occiput; the posterior portion is more or less broadly horse-shoe shaped, and bears two bristles on each side. The *mesonotum* is much less prominent than in most other Tipulidae, but has essentially the same structure, being divided by a V-shaped suture a little behind the middle, though the pair of

small pits so commonly seen in other Limnobiinae near the anterior margin is not distinctly noticeable; there are two submedian rows of small bristles in front of the suture, and a pair of large ones behind the suture; there are also three strong bristles on each side-margin, extending outwards, one just in front of and two behind the suture. The *scutellum* is separated from the main portion of the mesonotum by a pair of elongate-triangular depressions; it bears two strong bristles near the middle. The *meso-epimerum* bears a row of three or four bristles, just below the roots of the wings, and there is also a row of bristles on the *meso-sternum*.

The Male Abdomen is of a very primitive type. The first segment is a little shorter than broad; segments 2–7 all about equal in length, roughly twice as long as broad; segment 8 very short, but quite distinct and quite disconnected from the hypopygium, its tergal and sternal plates about equal in size. The ninth segment (*hypopygium*) consists of a tergite, two large side pieces and a sternite, which are connected with one another only by membrane. The tergite is quite a large plate, shortly pubescent in its apical portion and terminating in two strong bristles. The sternite is rather larger than the tergite, rounded or truncate apically, and has articulated to it a weakly chitinised, various-shaped, very pubescent plate, which is here regarded as representing the tenth sternite. The side pieces are rather longer than the tergite or sternite and are terminated by a long spine; they bear an upper and a lower appendage, the upper one in nearly all the species being a membranous, strap-shaped structure terminating in one long bristle and one short one; the lower one is elaborately divided up and frequently carries numbers of black spines. The penis sheath (adminiculum) is highly chitinised at its extremity and affords excellent specific characters, though it has not been possible to figure it in every case. Apart from the appendage to the ninth sternite, which may not have been correctly homologised, there are no distinct structures representing the tenth segment.

The Female Abdomen is shorter than that of the male, and apparently less primitive, since the eighth and ninth segments are fused and quite inseparable after boiling in potash. The ovipositor is very short but extremely complicated; I am not sufficiently sure of the homologies of the different parts to give a detailed description. The suture between the eighth and ninth segments is less evident than in other Tipulidae, but it can sometimes be made out in the dry specimens, though in microscope preparations it is less evident. The sternite of the seventh segment is very much larger than the tergite and serves to cover the terminal segments. I have called it the operculum; its outline varies according to the species.

Legs rather thickly clothed with long hair and with scattered stiff bristles; in the male the hairs are much longer than in the female, and the middle tibiae usually have a small tuft of bristles close to the tip; femora slightly thickened apically; tibiae without spurs at the tip; claws simple; empodia distinct, pulvilliform, a little more than half as long as the claws. Middle legs shorter than either of the other pairs, the proportions of the joints being roughly as follows :—

	Femur.	Tibia.	Tarsus.	Whole leg.
Front leg	19	18	17	54
Middle leg	18	13	11	42
Hind leg	20	16	13	49

Wings as long as the abdomen (*i. e.* in their total length; they do not reach to the tip of the abdomen) in the male; in the female slightly longer than the abdomen; costal fringe distinct; subcostal and radial veins with rows of small bristles; wing-surface microscopically pubescent. Sc just distinct from R, but lying extremely close to it; base of R dipped downwards; R_1 lying in contact with the costa from the origin of R_s onwards; Sc terminates and R originates at about one-third of the wing-length. R_{2+3} very short, joining the costa at a high angle just beyond the middle of the wing. R_{4+5} almost straight, running practically into the tip of the wing. M_1 and M_2 not separated; M_3 closely approximated to M_{1+2} at the tip of the discal cell, and occasionally fused with it for a short distance. Ascending portion of Cu_1 meets M_3 at about one-third of the length of the discal cell, and fused with it for a long space; the terminal free portion of Cu_1 is somewhat indented downwards, so that the cell Cu_1 is slightly contracted beyond the middle, and expands again a little at the apex; An nearly straight; Ax curved or bent near its tip, and not reaching the middle of the wing.

Table of the known living species of Styringomyia.

1. Wings quite unspotted; tibiae unicolorous . . . . 2.
   Wings with fairly distinct though small blackish spots (except in *S. impunctata*); tibiae at least with traces of dark rings 4.
2. Yellow species, wings hyaline . . . . . *flava*, Brun.
   Blackish species, wings strongly infuscated . . . . 3.
3. Femora yellow with broad blackish rings . *obscura*, Brun.
   Femora blackish except at the base . *solocipennis*, End.
4. Darker species; anterior half of mesonotum mainly black . 5.
   Lighter species; anterior half of mesonotum not black (unless discoloured) . . . . . 8.

5. A distinct dark patch towards the base of the wing over vein Cu . . . . . 6.
   No such patch present . . . . . 7.
6. Ax sharply bent downwards near the tip . *marshalli*, sp. n.
   Tip of Ax curved downwards . . . . *lineaticeps*, sp. n.
7. Femora yellow with two black rings . . *mahensis*, Edw.
   The dark rings of the femora so broad as almost to obliterate the yellow . . . . . *nigrofemorata*, sp. n.
8. No darkening of the membrane round the R-M cross-vein, though many of the veins are dark . . *impunctata*, sp. n.
   A distinct dark spot on the membrane round the R-M cross-vein . . . . . 9.
9. The short vein R_{2+3} largely dark (compare also *crassicosta* ♀) . . . . . 10.
   R_{2+3} entirely pale; the central dark spot does not extend into cells R_1 and R_{2+3} . . . . . 11.
10. Joints of palpi pale at their bases . . . *variegata*, sp. n.
    Palpi entirely blackish; all markings much less sharply defined *nigripalpis*, sp. n.
11. Tip of Ax angulated, with a stump arising from the angle, and a more or less distinct dark spot on the membrane round this stump . . . . . 12.
    Tip of Ax without any stump (except sometimes in *S. formosana*), and even when darkened the cloudiness does not extend on to the membrane . . . . . 16.
12. Slight but obvious dark clouds surrounding the tips of all the veins . . . . . *ceylonica*, Edw.
    No cloudiness on the membrane surrounding the tips of the veins, even though the tips themselves may be somewhat darkened . . . . . 13.
13. Second joint of antennae (normally) considerably darkened, often almost black . . . . . 14.
    Second joint of antennae yellowish, or occasionally slightly darkened . . . . . 15.
14. Male abdomen with a continuous median longitudinal dark stripe . . . . . *vittata*, sp. n.
    Male abdomen without such stripe . . *crassicosta*, Speiser.
15. Tenth sternite of male not trilobed . . *sjöstedti*, sp. n.
    Tenth sternite of male trilobed . . . *annulipes*, End.
16. Tip of Ax distinctly darkened . . . . . 17.
    Tip of Ax scarcely or not at all darkened . . . . 20.
17. Hardly a trace of darkening at the apex of the discal cell *formosana*, sp. n.
    Veins at apex of discal cell obviously darkened . . . 18.

18. Head bristles yellowish; tip of Ax bent backwards *javana*, sp. n.
Head bristles black (normal); tip of Ax rounded . . 19.
19. Veins (except Ax) not darkened at their tip . *jacobsoni*, sp. n.
All the veins darkened at their tips . . . *fryeri*, sp. n.
20. Male abdomen with dark patches on the basal halves of segments 2–6 . . . . . 21.
Male abdomen without dark patches in this position . . 22.
21. Thorax with fairly evident though ill-defined darker markings *bancrofti*, sp. n.
Thorax almost unicolorous yellow-ochreous . *himalayana*, sp. n.
22. Vein Cu somewhat darkened . . . . *nepalensis*, sp. n.
Vein Cu not darkened, except at origin of Cu_1 *didyma*, Grim.

FOSSIL SPECIES.

1. **S. venusta,** Lw. (1845).

Although this species has only been imperfectly described, it must, if Loew's figure of the wing is accurate, be quite distinct from all known living species. According to this figure, Cu_1 is not at all indented after leaving M_3, and Ax runs practically straight to the hind margin, while in all living species it is curved or bent downwards at its tip. In addition to this Sc is not shown, but this is probably an oversight; its presence has also been overlooked in some of the recently described species. In all other respects the descriptions of Loew and Osten-Sacken would apply almost equally well to any of the other species.

Copal (origin not stated).

RECENT SPECIES.

Group I.

Wings without the least trace of dark dots; tibiae quite unicolorous; side pieces of male genitalia terminating in three spines.

2. **S. flava,** Brun. (1911).

Figs. 10 and 11.

There is very little to add to Brunetti's description. The second joint of the antennae is dark brown; the posterior margins of the abdominal segments with brown bands, narrowed but not quite interrupted in the middle. The tibiae and tarsi are entirely yellow, except the fifth tarsal joint, which is dark brown.

Type in the Indian Museum, Calcutta.

Loc. Tenmalai, Travancore, S. India. 1 ♂.

3. **S. obscura,** Brun. (1911).

Figs. 46 and 47.

Wings without distinct dark markings, but the whole membrane slightly infuscated, and there are slightly darker clouds about the apex of the upper basal cell and above the base of Cu; all the veins blackish.

Type in the Indian Museum, Calcutta.

Loc. Thamaspur, Nepal. Known only from one female. (Brunetti was mistaken as to the sex of his specimen.)

4. **S. solocipennis,** End. (1912).

Figs. 12 and 13.

A very dark-coloured species. Wings rather strongly infuscated, a little darker towards the costa. Side pieces of hypopygium with three terminal spines, as in *S. flava*; adminiculum with a few hairs at its tip—a most unusual character.

Type in the Stettin Museum.

Loc. Madagascar: Ambodimanga (*Hammerstein*), 3 ♂.

Group II.

Wings with fairly distinct dark specks (except in *S. impunctata*) on the R-M cross-vein and at the base of the ascending portion of Cu_1, usually also at the junction of or the cross-vein connecting M_{1+2} and M_3. Legs with dark rings or spots in the following positions: on the front and middle femora one just beyond the middle and another usually a little before the tip; on the hind femora one in or immediately before the middle and another a little before the tip; on all the tibiae one just before the middle and another at the tip; the fifth tarsal joint always blackish. Side pieces of hypopygium (except in *S. sjöstedti*) terminating in one spine.

5. **S. marshalli,** sp. n.

Figs. 5, 48 and 49.

Head dark blackish brown, palpi and first two joints of antennae entirely black; flagellum dark brown. *Thorax* almost entirely black; with grey reflections; lower half of pleurae yellow. *Abdomen* black (probably discoloured). *Legs* yellow, the rings very distinct, black; on the fore and mid femora the apical ring includes the whole apex, on the hind femora it leaves the apex narrowly yellow. The tips of all the tarsal joints are dark brown. *Wings* as in the figure;

veins dark, except the costa, R_s, R_{2+3} and An, which are yellowish. There is a slight darkening of the membrane at the extreme base of the wing in the cell Ax. Halteres yellowish, the knob somewhat darkened.

Type in the British Museum.

Loc. Mashonaland: Salisbury, March 1900 (*G. A. K. Marshall*), 1 ♀.

6. S. lineaticeps, sp. n.

Figs. 3, 4, 14 and 50.

Head blackish, with a narrow median longitudinal yellowish line. Palpi black, the joints somewhat lighter at the base. Antennae with the two basal joints entirely black, the flagellum brownish, with indications of a darker ring on each joint. *Thorax* mainly black dorsally, with light grey patches as in the figure; pleurae entirely yellowish. *Abdomen* of male yellowish-brown, with a rather large dark brown patch at the base of each segment, and another towards the hind margin; the actual hind margin blackish. In the female the abdomen is darker and all the markings are obscured. *Legs* as in *S. marshalli*, but in the female there is just a trace of the yellow ground-colour at the tips of the fore and mid femora. *Wings* much as in *S. marshalli*, but Ax is evenly curved to the hind margin, and there is no dark patch in the cell Ax.

Type in the British Museum, presented by the Imperial Bureau of Entomology.

Loc. British East Africa: Mumias district, N. Kavirondo, 3. ix. 1911 (*C. W. Woodhouse*), 1 ♂ 1 ♀ taken *in coitu* in tent.

7. S. mahensis, Edw. (1912).

This species is not figured, as the genitalia of both sexes are identical in structure with those of *S. annulipes*, End. The difference of colour between the two forms is, however, very striking. In *S. mahensis* the mesonotum is mainly black, and the rings on the legs are black and much broader than in *S. annulipes*, though the tips of all the femora remain yellow. The angle of Ax always carries a distinct spur, though this varies in length. Otherwise there is no noticeable variation, even in colour.

Type in the British Museum.

Loc. Seychelles Is.: Mahé (*H. Scott*), 10 ♂, 2 ♀.

8. **S. nigrofemorata,** sp. n.

Fig. 51.

Head dark brown. Antennae with the first joint dark brown below, lighter brown above; second joint dark brown; remaining joints yellowish brown with traces of darker rings. *Thorax* mainly black; light grey areas in the middle of the pronotum, on the middle of the posterior half of the mesonotum and in the middle of the scutellum; upper half of pleurae dark brown, lower half orange-yellow. *Abdomen* black (discoloured). *Legs:* femora mainly blackish brown, light yellowish on the basal fifth, a narrow yellow ring at the base of the apical third, tip yellow. Tibiae brownish in ground-colour, with the usual dark rings, which are fairly broad. *Wings* slightly infuscated; the dark spot over the R-M cross-vein does not extend into cells R_1 or R_{2+3}. M_{1+2} and Ax are somewhat darker than the other veins; Ax with its tip evenly curved to the hind margin. Halteres rather dark.

Type in the British Museum.
Loc. Malay States: Taiping (*L. Wray, junr.*), 1 ♀.

9. **S. impunctata,** sp. n.

Figs. 15, 16, 52 and 53.

Head yellowish, with some small dark brown patches. First joint of antennae dark below, light above; second dark brown. *Thorax:* pronotum dark brown at the sides, yellow in the middle. Mesonotum yellowish-brown; a narrow median dark brown line extends from the front half-way back towards the suture; on each side of this along the line of bristles, is another narrow dark brown line, nearly reaching the suture, where it bends outwards to the margin. Scutellum and postnotum dark brown with a yellow median line. *Abdomen* dingy yellowish, the basal halves and the posterior borders of the segments obscurely brownish. *Legs* (those of the male missing) dingy yellowish, the rings complete, fairly narrow, normal in position. Joints of tarsi slightly darker at the tips. *Wings* without any dark spots on the membrane, except a very slight trace round the R-M cross-vein. All the veins dark except Costa and R_1. Ax angulated, the apical portion slightly recurrent, a very short spur at the angle.

Type in the British Museum.
Loc. Northern Nigeria: Zungeru, Nov. 1910 (*Dr. J. W. Scott Macfie*), 1 ♂, 1 ♀.

10. **S. variegata,** sp. n.

Figs. 1, 2, 17, 18 and 54.

Whole insect yellow with rather sharply defined dark brown markings as in fig. 1. Underside of the first and the whole of the second segment of the antennae dark brown. Segments 2–6 of abdomen all similarly marked, seventh segment in male with a continuous median dark stripe; ninth tergite dark brown; side pieces of hypopygium yellow, brown at the base. In the female abdomen the basal half of each segment is dark, the apical half also mainly so. *Legs* with the usual dark rings, all of them complete. *Wings* as in the figure (fig. 2). Knob of halteres dark.

Type in the Paris Museum, preserved in alcohol.

Loc. German East Africa: Kilema, 30. iii. 1912 (*Ch. Alluand* and *R. Jeannel*), 2 ♂, 2 ♀.

11. **S. nigripalpis,** sp. n.

Figs. 19, 20, 55 and 56.

Head greyish-ochreous. Antennae as usual with the first joint dark below, light above, the second joint entirely dark; the flagellum yellowish, the dark hairs giving a suggestion of darker rings. *Thorax* mainly dingy greyish-ochreous dorsally; margins of pronotum and mesonotum rather broadly dark brown, and a narrow dark brown line along the submedian row of bristles. *Abdomen* rather dark; ground-colour dingy ochreous; a pair of dark patches on the basal half of each segment, and a dark patch on the hind margins, narrowed in the middle. *Legs* with the pubescence shorter than usual; the rings complete; tips of the tarsal joints very little darkened. *Wings* with the normal venation; Ax curves evenly to the hind margin; M_3 touches M_{1+2} and in two of the three specimens it is fused with it for a short distance. The dark spots are rather larger than usual; that over the R-M cross-vein extends into the cell R_{2+3}. Veins dark, except the costa, R_s and R_{4+5}, which are more yellowish.

Type in the British Museum; paratypes in Mr. Patterson's collection.

Loc. Gold Coast: Aburi, 8. i. 1911, 1 ♂ (*L. Armstrong*); 1912, 1 ♂ 1 ♀ (*W. H. Patterson*).

12. **S. ceylonica,** Edw. (July 1912).

Figs. 21, 22, 57, 58 and 59.

The characters given in the key, together with those of

the genitalia, are quite sufficient for the identification of this species, so that it is unnecessary to redescribe it.

Brunetti (1912) figures the hypopygium of this species. His figure is not very accurate, but contrary to my previous statement (1913) it evidently represents the true *S. ceylonica* in dorsal view, as correctly stated by him; moreover, it does not resemble that of *S. didyma*. However, although Brunetti's figure does represent this species, his elaborate redescription has proved to have been based on a mixed series, consisting probably of four species.

Type in the British Museum.

Loc. Ceylon: Weligama (*T. B. Fletcher*), 1 ♂. India: Kankondigee, Sunderbuns, 14. xi. 09 (*J. T. Jenkins*), 1 ♀ at light on board launch; Bhogaon, Purneah district, N. Bengal (*C. Paiva*), 1 ♀; Puri, Orissa Coast (*N. Annandale*), 1 ♂ 1 ♀. Malay States: Taiping (*L. Wray, junr.*), 1 ♂ 1 ♀. Java: Pasuruan (*Kobus*), 1 ♂ 1 ♀. Formosa: Tainan (*H. Sauter*), 5 ♂ 2 ♀. As this seems to be the most widely-spread species of the genus, the name *ceylonica* is unfortunate. I have confirmed the identification of all the above-mentioned specimens; in none of them was there any noticeable variation from the Ceylon type.

13. S. vittata, sp. n.

Figs. 23, 60, 61, 62 and 63.

Head brownish yellow with some darker patches and indications of a more yellowish median line. First joint of antennae yellow, brown beneath, second brown, rest yellow. *Thorax* brownish-yellow with rather indistinct darker markings consisting of four longitudinal lines, the outer pair being near but not at the margin of the mesonotum. Pronotum, scutellum and postnotum are as usual brown at the sides, yellow in the middle. *Abdomen* of male yellowish, with a broad, continuous median dark stripe which broadens out somewhat in the middle of each segment; hind margins of the segments darker brown; ninth tergite dark brown, rest of hypopygium yellow. In the female, even when the abdomen is not discoloured, the median dark stripe is much less distinct. *Legs* yellow; the rings narrow, incomplete ventrally and sometimes rather indistinct; on the hind tibiae the median ring may be absent altogether. Joints of tarsi of fore and mid legs slightly darker at their tips, those of hind legs scarcely perceptibly so. *Wings* with the veins yellow, except the ascending portion of Cu_1, which is mainly black; a small black spot over the R-M cross-vein not extending into cell R_{2+3}; other black spots as usual at the junction of

M_{1+2} and M_3 and at the angle of Ax, and smaller ones at each of the lower angles of the discal cell. Tip of Ax angulated, a distinct spur arising from the angle. Halteres yellow.

Type in the British Museum.

Loc. S. Rhodesia: Salisbury (*G. A. K. Marshall*), 1 ♂ (type), 1 ♀. Natal: Malvern (*G. A. K. Marshall*), 1 ♂; Umhlali (*K. H. Barnard*), 1 ♀. Portuguese East Africa: Delagoa Bay, 1 ♀. British East Africa: Nairobi (*R. Ford*), 1 ♀; Kabete (*T. J. Anderson*), 1 ♂; Wambogo (*Alluaud* and *Jeannel*), 2 ♀; lower forests of Mt. Kenya (*Alluaud* and *Jeannel*), 1 ♂. Nyasaland: Mt. Mlanje (*S. A. Neave*), 3 ♀. N. Nigeria: Beri (*J. J. Simpson*), 1 ♀. Gold Coast: Bibiani (*H. G. F. Spurrell*), 1 ♂ 1 ♀.

From its distribution it is probable that this is the species referred to by Osten-Sacken (1873) as existing in the Stockholm museum. I am informed, however, by Dr. Sjöstedt that the original Caffraria specimens are lost. This is the species which I formerly (1912) took to be *S. crassicosta* (Speiser), but a more careful comparison of the male genitalia revealed specific differences, and there is also an obvious difference in the colour of the male abdomen. The ovipositor of the female from the Gold Coast is figured in order to show its appearance when the apical appendages are more retracted.

14. **S. crassicosta** (Speiser 1908).

Idiophlebia crassicosta, Speiser, ♂.

Figs. 24, 25, 64 and 65.

A rather light yellowish species. Second joint of antennae dark. Dorsum of thorax with some darker patches, one just above the root of the wing being the most conspicuous. Abdomen light yellowish, except for pairs of brown spots at the hind corners of each segment; 6th and 7th segments largely dark. Rings on legs narrow but complete, normal in position. Wings with the usual dark spots, which are very distinct. Tip of Ax with a rather long spur.

Speiser's original series of 2 ♂ 2 ♀ really comprised two species; the male figured by him must be regarded as the type of *S. crassicosta*; the other male and one of the females are described below as *S. sjöstedti*, sp. n. The second female (which is not the one figured by Speiser) may be the

female of *S. crassicosta*, and is figured here as such, but it differs from the male in having the vein R_{2+3} partly black.

Type in the Stockholm Museum.

Loc. KAMERUN (*Sjöstedt*), 1 ♂ 1 ♀.

15. S. sjöstedti, sp. n.

Idiophlebia crassicosta, Speiser, ♀.

Figs. 26, 27, 66 and 67.

Much resembles *S. crassicosta*, except in genitalia. Second joint of antennae all pale yellowish. Palpi yellow, the joints only slightly darker at their tips. Thorax yellowish brown without any distinct markings, except that the pronotum has a small pale median patch, the "collar" has its front margin darker, and the centre of the postnotum is pale. Legs missing. Dark spots on the wing less black and distinct than in *S. crassicosta* and the spur of Ax shorter.

Type in the Stockholm Museum.

Loc. KAMERUN (*Sjöstedt*), 1 ♂ (type) 1 ♀.

16. S. annulipes (End. 1912).

Pycnocrepis annulipes, End. (Feb. 1912).
Styringomyia howardi, Alex. (March 1912).

Figs. 28, 29, 68 and 69.

Closely resembles *S. sjöstedti* except in the genitalia. I have previously (1912) mentioned *S. howardi* as a synonym of *S. crassicosta*; this assumption was made on purely *a priori* grounds, and an examination of the type of *S. howardi* has since proved it to be incorrect.

Type of *annulipes* in the Stettin Museum; of *howardi* in Ithaca, N.Y.

Loc. MADAGASCAR: Ambodimanga (*Hammerstein*), 5 ♂. SEYCHELLES IS.: Silhouette, 6 ♂ 3 ♀; Mahé, 1 ♂; Dennis I. (*H. Scott*), 2 ♂. PORTUGUESE EAST AFRICA: Quilimane (*C. W. Howard*), 1 ♂ 1 ♀.

17. S. formosana, sp. n.

Figs. 9, 30, 31, 70, 71 and 72.

Head with two dark brown stripes on the occiput. First joint of antennae dark on the underside, second all dark. Palpi dark, the joints very little paler at the base. *Thorax*: front portion of pronotum pale in middle; collar pale, with dark front margin. Mesonotum brown, with a broad darker brown median stripe; margins pale; posterior humps pale in the middle. Scutellum pale

in the middle and at the sides. Postnotum with narrow pale median stripe. Pleurae, sternum, coxae and trochanters orange-yellow. *Abdomen* of male with the first two segments mainly dark; segments 3–6 as in fig. 9; segment 7 with a broad median dark stripe; eighth segment and hypopygium all yellow. In the female the abdomen is darker, without any distinct markings, though there are pale areas on the apical halves of the apical segments. *Legs* with the usual narrow dark rings, which are sometimes not quite complete; all the tarsal joints dark at the tip. *Wings* nearly clear, but there are small dark suffusions round the R-M cross-vein, and at the base of Cu_1, though not on R_{2+3} or at the junction of M_{1+2} and M_3. The vein M_{1+2}, the ascending portion of Cu_1 and the apex of Ax are dark, but the darkness does not extend on to the membrane. Tip of Ax variable in form, being either curved, angulated, or with a short or long spur.

Type in the Deutsch. Ent. Museum; paratypes in the British Museum.

Loc. Formosa: Tainan, 9 ♂ 5 ♀; Koshun, 1 ♂ 1 ♀ (*H. Sauter*). The species has previously been identified by Riedel (1913) as *S. crassicosta*.

18. **S. javana,** sp. n.

Figs. 8, 32 and 33.

Head yellowish; bristles yellow. Antennae yellow, with the first segment dark beneath, the second entirely dark. *Thorax* marked much as in *S. jacobsoni* (fig. 6), but rather lighter. *Abdomen* with segments 3–6 as in the figure; second segment yellowish with a pair of dark spots on the hind margin. *Legs* with the dark rings reduced almost to spots on the upper surface; the subapical ring on the hind femora and the ring in the middle of the hind tibiae are only just perceptible as a slight darkening. Joints of hind tarsi not at all darkened at their tips; those of fore and mid legs only slightly so. Tuft of black bristles at the tip of the middle tibia not so distinct as usual. *Wings* with the usual dark spots; veins not infuscated at their tips; tip of Ax dark, bent backwards; M_{1+2} scarcely darker than the other veins.

Type in the Amsterdam Museum.

Loc. Java: Nongkodjadjar (*E. Jacobson*), 1 ♂.

19. **S. jacobsoni,** sp. n.

Figs. 6, 7, 34, 35 and 73.

Head as in *S. javana*, except that the bristles are black. *Thorax* marked as in fig. 6. *Abdomen* of male yellow with segments 3–6

marked with brown as in fig. 7; seventh segment with a median dark brown stripe expanded in the middle; hypopygium all yellow-ochreous. In the female the abdomen has a continuous, rather obscure, brown median stripe. *Legs* with the dark rings incomplete ventrally; in the male the ring in the middle of the hind tibia is very faint; joints of hind tarsi scarcely darkened at their tips. *Wings* as in *S. javana*, except that Ax is evenly curved to the hind margin.

Type in the Amsterdam Museum.

Loc. Java: Semarang, 2 ♂ 1 ♀; Batavia, 1 ♂ (type) 1 ♀ (*E. Jacobson*). Previously determined by de Meijere (1911) as *S. didyma*, Grim.

20. **S. fryeri,** sp. n.

Figs. 36, 37, 74 and 75.

Head yellowish, with darker patches near the neck. Antennae and palpi coloured as usual. *Thorax* brownish with some darker root markings, the most distinct of which is a patch just above the root of each wing; scutellum not distinctly darker at the sides. Some of the small admedian bristles are aggregated into a pair of small tufts towards the front of the mesonotum. *Abdomen* of male yellowish-brown, with traces of darker patches on the basal halves of the segments, most distinct on segments 6 and 7; there are also pairs of distinct dark brown spots on the hind margins of each of segments 2–7. Abdomen of female similarly but less distinctly marked. *Legs* with all the dark rings distinct and complete, the tips of all the tarsal joints dark. *Wings*: R_{2+3} a little more nearly vertical than usual; tip of Ax sharply curved to the hind margin. The dark spot over the R-M cross-vein just extends over the base of R_{2+3}; all the veins slightly but distinctly darkened at their tips; a slightly darker cloud above Cu towards the base of the wing.

Type in the British Museum.

Loc. Ceylon: Peradeniya (*J. C. F. Fryer*), 1 ♂ (type) 1 ♀; also 1 ♀ in the Indian Museum from the same locality. This is the species referred to rather inaccurately by me (1913) as "*S. ceylonica*, Brun. (*nec* Edw.)." Brunetti's series contained only a single female.

21. **S. himalayana,** sp. n.

Figs. 40, 41 and 77.

Resembles *S. fryeri*, but a little smaller and much yellower, all the dark markings being reduced; thorax almost unicolorous yellow-ochreous; terminations of the veins (except that of Ax) not in the least darkened.

Type in the Indian Museum, Calcutta.

Loc. E. Himalayas: Sukna (*N. Annandale*), 1 ♂ 1 ♀ *in coitu*. Previously included by Brunetti under *S. ceylonica*.

22. **S. nepalensis,** sp. n.

Figs. 42, 43, 78 and 79.

Resembles *S. fryeri*, but wing markings less sharply defined; vein Cu uniformly dark, but no suffusion just above it near the base; darkening of tip of Ax much less pronounced; no perceptible darkening at the tips of the other veins. Basal halves of abdominal segments of male darkened, but the dark spots on the hind margins of the segments are not clearly defined.

Type in the Indian Museum, Calcutta.

Loc. Nepal: Sukhwani (*Mus. Collr.*), 1 ♂ 1 ♀. Previously included by Brunetti with *S. ceylonica*. The hypopygium rather closely resembles that of *S. himalayana*, of which species *S. nepalensis* may perhaps be only a variety.

23. **S. bancrofti,** sp. n.

Figs. 44, 45, 80 and 81.

Head yellow; antennae yellow with the second joint brown. *Thorax* yellowish brown; the pronotum as usual darker at the sides; mesonotum with two darker brown lines, jointed in front, diverging behind, and extending as far back as the suture; a small dark area above the root of each wing. *Abdomen* of male yellow with a dark patch on the basal half of each segment, broadest at its apex, and two more or less confluent dark spots on the hind margin of each segment. Female abdomen similarly marked. *Legs* with all the dark rings distinct, complete, the tips of all the tarsal joints dark. *Wings* with normal venation and markings; the veins yellowish except where the dark specks occur; Ax evenly curved to the hind margin.

In the hypopygium the upper claspers are very much reduced.

Type in the British Museum.

Loc. Queensland: Burpengary (*Dr. T. L. Bancroft*), 3 ♂ 2 ♀. Previously included by me (Aug. 1911) in *S. didyma*.

24. **S. didyma,** Grim. (1901).

Idiophlebia pallida, Grünberg (1903).

Figs. 38, 39 and 76.

Differs from *S. bancrofti* by the characters given in the key, as

well as in the genitalia. In the hypopygium the upper claspers are modified into strongly chitinised, downwardly projecting hooks, which make the hypopygium appear very different from that of any of the other species. I have not examined the type of *I. pallida*, but Grünberg's figures render its identification easy; he has, however, omitted the ninth tergite, which has a characteristic form.

Type of *S. didyma* in the British Museum; of *I. pallida* in the Berlin Museum; additional specimens in the Edinburgh Museum.

Loc. Sandwich Is.: Honolulu, Waiahua (*Dr. R. C. L. Perkins*); Caroline Is.: Yap (*Volkens*).

Bibliography.

1845. Berendt, G. C. Die im Bernstein befindlichen organischen Reste, etc. Tom. 1.—The name *Styringia*, evidently intended for Loew's genus, occurs in a list of amber genera, but no characteristics whatever are given (p. 57).

1845. Loew, H. Dipt. Beitr., Posen, i, p. 6.—The genus *Styringomyia* with the type species *S. venusta* described for the first time (p. 6).

1850. Loew, H. Bernstein und Bernsteinfauna.—*S. venusta* wrongly referred to as *S. pulchella* (p. 31); *Styringomyia* placed in a table of genera of amber Tipulidae (p. 36); a second species, represented by a single male found in amber, mentioned but not described as *S. gracilis* (p. 38).

1869. Osten-Sacken, Baron C. R. Diptera of North America, Part 4.—Loew quoted, and his figure of the wing copied; a specimen in Zanzibar copal briefly described but not named (p. 102).

1873. Osten-Sacken, Baron C. R. Diptera of North America, Part 3.—The statement made that recent specimens from Caffraria existed in the Stockholm Museum (additions to Vol. IV, p. vii).

1887. Osten-Sacken, Baron C. R. Studies in Tipulidae, II. Berl. Ent. Zeitschr.—The statements of 1873 repeated.

1894. Scudder, S. H. Tertiary Tipulidae, with special reference to those of Florissant, Colorado. Proc. Amer. Phil. Soc., XXXII.—Knowledge of the genus briefly summarised (p. 13).

1901. Grimshaw, P. H. Fauna Hawaiiensis. Diptera.—*S. didyma*, sp. n. (p. 10).

1903. Grünberg, K. Zool. Anzeiger, XXVI.—*S. didyma* redescribed as *Idiophlebia pallida*, n. g. n. sp. (p. 524).

1908. Spieser, P. Berl. ent. Zeitschr., LII.—*Idiophlebia crassicosta*, sp. n. (p. 132), a true *Styringomyia*; *S. cornigera*, sp. n. (p. 130) belongs to the totally distinct genus *Ceratocheilus*.

1908. Needham, J. G. New York State Museum, Bull. 124.—An inaccurate copy of Osten-Sacken's copy of Loew's figure of *S. venusta* is given. (pl. xxvi, fig. 6).

1911. De Meijere, J. C. H. Tijd. v. Ent., deel. LIV.—*S. didyma* recorded (wrongly, as has since appeared) from Java (p. 42).

1911 (July). Edwards, F. W. Ann. Mag. Nat. Hist. (8) VIII.—*S. ceylonica*, sp. n. (p. 62).

1911 (August). Edwards, F. W. Ann. Mag. Nat. Hist. (8) VIII.—Identity of *S. didyma* and *Idiophlebia crassicosta* suggested (p. 281); *S. didyma* recorded (wrongly) from Queensland (p. 282).

1911. Brunetti, E. Rec. Ind. Mus. VI, Part V.—*Styringomyia* placed near *Gonomyia* (p. 297); *S. ceylonica*, Edw., redescribed (p. 298); *S. obscura*, sp. n. (p. 300); *S. flava*, sp. n. (p. 301).

1912 (February). Enderlein, G. Zool. Jahrb. Abt. Syst., XXXII.—*Styringomyia* redescribed as *Pycnocrepis* n. g. (p. 65); *P. annulipes*, sp. n. (p. 65); *P. solocipennis*, sp. n. (p. 67).

1912 (March). Alexander, C. P. Canadian Ent.—*S. howardi*, sp. n. [= *annulipes*, End.] (p. 83).

1912. Edwards, F. W. Trans. Linn. Soc. London, XV, Part 2.—*S. mahensis*, sp. n. (p. 206); *S. annulipes* (End.) recorded from the Seychelles Is. (p. 207), etc.

1912. Riedel, M. P. Ent. Mitt. Deutschen Ent. Mus., I.—*P. annulipes*, End., and *P.* " sp. n." recorded from Formosa (p. 26).

1912. Brunetti, E. Fauna Brit. Ind., Dipt. Nem.—Descriptions and notes reprinted from 1911 paper.

1913. Alexander, C. P. Psyche, Vol. XX.—*Styringomyia* placed in key to Antochine genera (p. 41).

1913. Riedel, M. P. Ent. Mitt. Deutschen Ent. Mus., II.—"*Pycnocrepis* nov. sp.," Riedel, referred to *S. ceylonica*, Edw. (p. 273).
1913. Edwards, F. W. Ann. Mag. Nat. Hist. (8) XII.—Additional specimens recorded from Ceylon and some incorrect statements made (p. 203) [see notes to *S. ceylonica* and *S. fryeri*].

ADDENDUM.

Styringomyia leucopeza, sp. n.

Entirely black, with the following exceptions: the last 8–10 joints of the antennae, joints 2–4 of the front tarsi and joints 1–4 of the hind tarsi yellowish-white. Front femora and tibiae at the base, front metatarsi at the apex, middle tibiae and the first four joints of the middle tarsi at the base, and the hind tibiae at the base, narrowly yellowish-brown. An ill-defined yellowish-brown ring near the base of the middle femora. Abdomen and legs somewhat shining. *Wings* with normal venation; somewhat strongly infuscated; darker markings in the usual positions, but ill defined and much larger than usual, the spot over the R-M cross-vein extending upwards to the costa. *Hypopygium:* 9th tergite deeply indented at the apex; side pieces with one terminal spine.

Loc. Nyasaland: Mlanje, Jan.–Feb. 1914, 8 ♂ 1 ♀ (*Dr. J. B. Davey*).

Types presented to the British Museum by the Imperial Bureau of Entomology.

Explanation of Plates XIX–XXV.

[All the figures of genitalia are magnified 50 diameters, the rest 13 diameters. Except in the case of *S. crassicosta*, all the figures of genitalia have been prepared from specimens cleared in potash and mounted in balsam; it should be noted that owing to this treatment the apical parts are more exserted and the male hypopygium appears broader than in the dry specimens.]

Fig.

1. *S. variegata*, sp. n. Head, thorax, and part of abdomen.
2. „ Wing.

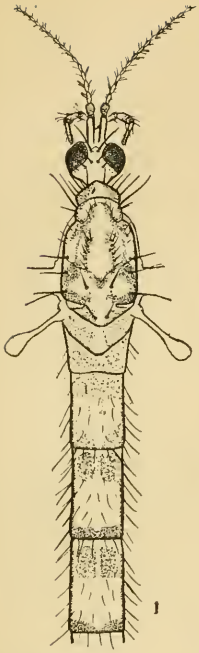
Fig.

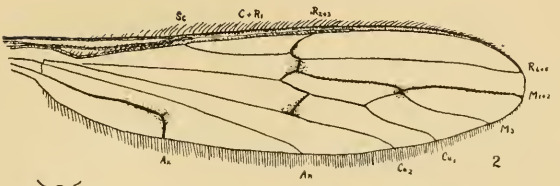
3. *S. lineaticeps*, sp. n. Thoracic markings.
4. „ „ Wing.
5. *S. marshalli*, sp. n. „
6. *S. jacobsoni*, sp. n. Thoracic markings (♂♀).
7. „ Abdominal markings of ♂ (4th segment).
8. *S. javana*, sp. n. „ „ „ „ „
9. *S. formosana*, sp. n. „ „ „ (3rd and 4th segments).
10. *S. flava*, Brun. Male hypopygium from above.
11. „ „ „ „ below.
12. *S. solocipennis*, End. „ „ „ above.
13. „ „ „ „ below.
14. *S. lineaticeps*, sp. n. „ „ „ „ (outline of ninth tergite dotted in).
15. *S. impunctata*, sp. n. Male hypopygium from above.
16. „ „ „ „ „ below.
17. *S. variegata*, sp. n. „ „ „ above.
18. „ „ „ „ „ below.
19. *S. nigripalpis*, sp. n. „ „ „ above.
20. „ „ „ „ „ below.
21. *S. ceylonica*. Edw. „ „ „ above.
22. „ „ „ „ „ below.
23. *S. vittata*, sp. n. „ „ „ above.
24. *S. crassicosta*, Speiser. „ „ „ „
25. „ „ „ partly from side.
26. *S. sjöstedti*, sp. n. „ „ from above.
27. „ „ „ „ „ the side.
28. *S. annulipes* (End.). „ „ „ above.
29. „ „ „ „ below.
30. *S. formosana*, sp. n. „ „ „ above.
31. „ „ „ „ „ below.
32. *S. javana*, sp. n. „ „ „ above.
33. „ „ „ „ „ below.
34. *S. jacobsoni*, sp. n. „ „ „ above.
35. „ „ „ „ „ below.
36. *S. fryeri*, sp. n. „ „ „ above.
37. „ „ „ „ „ below.
38. *S. didyma*, Grim. „ „ „ above.
39. „ „ „ partly from side.
40. *S. himalayana*, sp. n. „ „ from above.
41. „ „ „ „ „ below.
42. *S. nepalensis*, sp. n. „ „ „ above.
43. „ „ „ „ „ below.

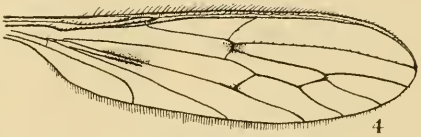
FIG.

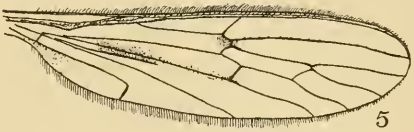
44. *S. bancrofti*, sp. n. Male hypopygium from above.
45. ,, ,, ,, ,, ,, below.
46. *S. obscura*, Brun. Tip of ♀ abdomen from above.
47. ,, ,, ,, ,, below.
48. *S. marshalli*, sp. n. ,, ,, ,, above.
49. ,, ,, ,, ,, ,, below.
50. *S. lineaticeps*, sp. n. ,, ,, ,, ,,
51. *S. nigrofemorata*, sp. n. ,, ,, ,, ,,
52. *S. impunctata*, sp. n. ,, ,, ,, above.
53. ,, ,, ,, ,, ,, below.
54. *S. variegata*, sp. n. ,, ,, ,, ,,
55. *S. nigripalpis*, sp. n. ,, ,, ,, above.
56. ,, ,, ,, ,, ,, below.
57. *S. ceylonica*, Edw. ,, ,, ,, above.
58. ,, ,, ,, ,, below.
59. ,, ,, ,, ,, side.
60. *S. vittata*, sp. n. ,, ,, ,, above (Mashona land).
61. ,, ,, ,, ,, ,, below ,,
62. ,, ,, ,, ,, ,, above (Gold Coast).
63. ,, ,, ,, ,, ,, below.
64. *S. crassicosta*, Speiser. ,, ,, ,, above.
65. ,, ,, ,, ,, ,, below.
66. *S. sjöstedti*, sp. n. ,, ,, ,, above.
67. ,, ,, ,, ,, ,, below.
68. *S. annulipes*, End. ,, ,, ,, above.
69. ,, ,, ,, ,, ,, below.
70. *S. formosana*, sp. n. ,, ,, ,, above.
71. ,, ,, ,, ,, ,, below.
72. ,, ,, ,, ,, ,, side.
73. *S. jacobsoni*, sp. n. ,, ,, ,, below.
74. *S. fryeri*, sp. n. ,, ,, ,, above.
75. ,, ,, ,, ,, ,, below.
76. *S. didyma*, Grim. ,, ,, ,, ,,
77. *S. himalayana*, sp. n. ,, ,, ,, above.
78. *S. nepalensis*, sp. n. ,, ,, ,, ,,
79. ,, ,, ,, ,, ,, below.
80. *S. bancrofti*, sp. n. ,, ,, ,, above.
81. ,, ,, ,, ,, ,, below.

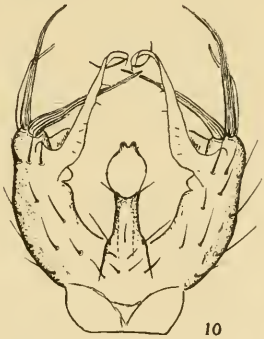
JUNE 25th, 1914.

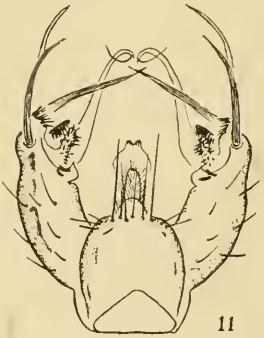


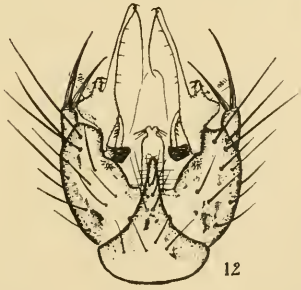


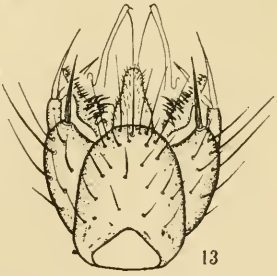












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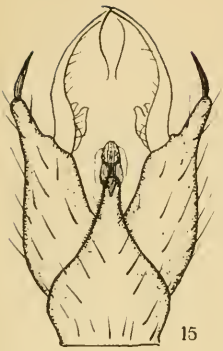
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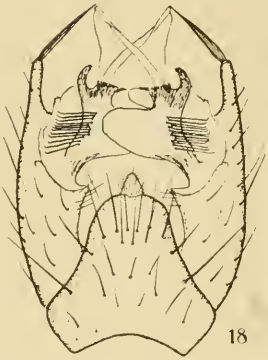
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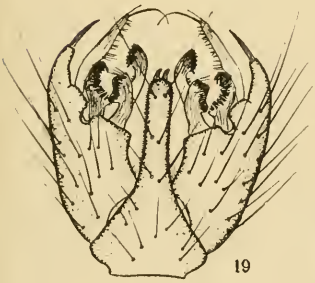
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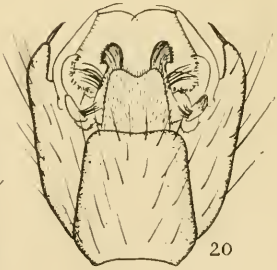
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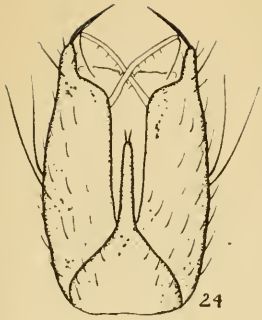

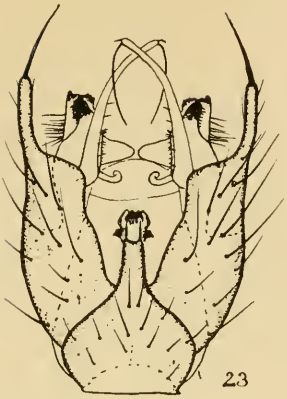

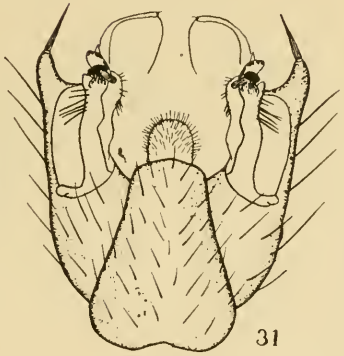

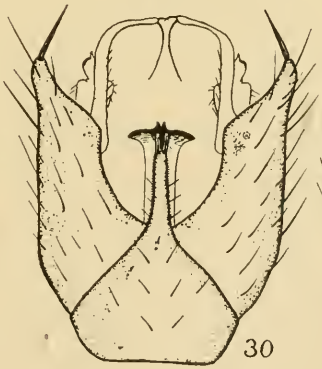

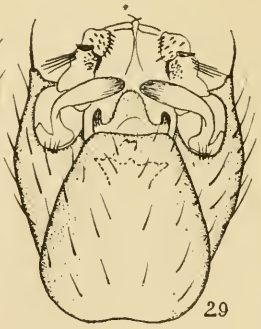

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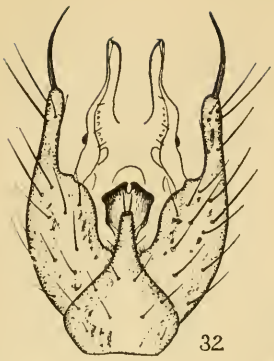

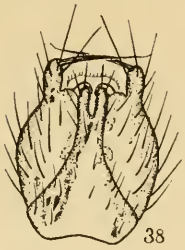

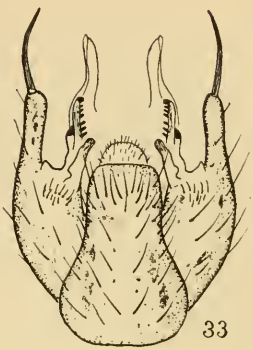

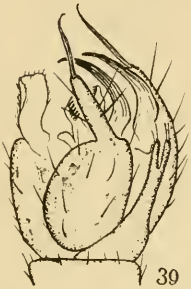

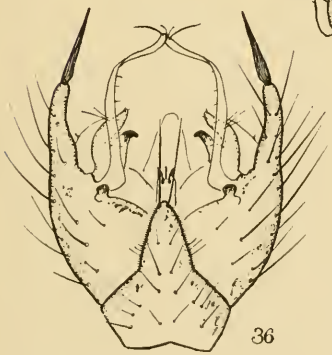

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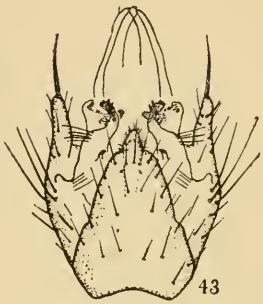

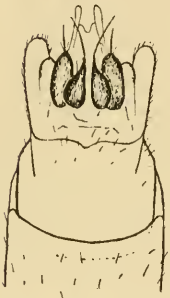

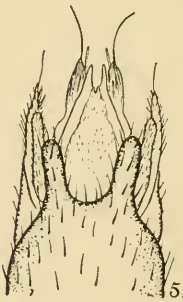

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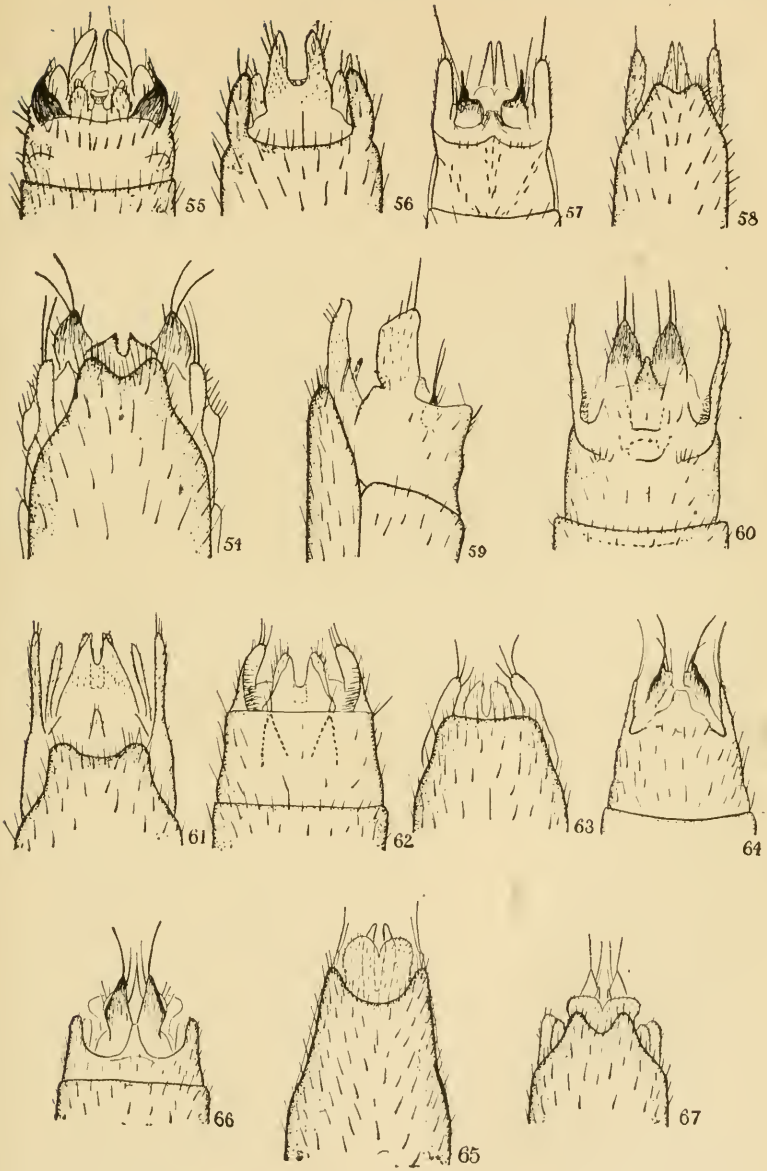

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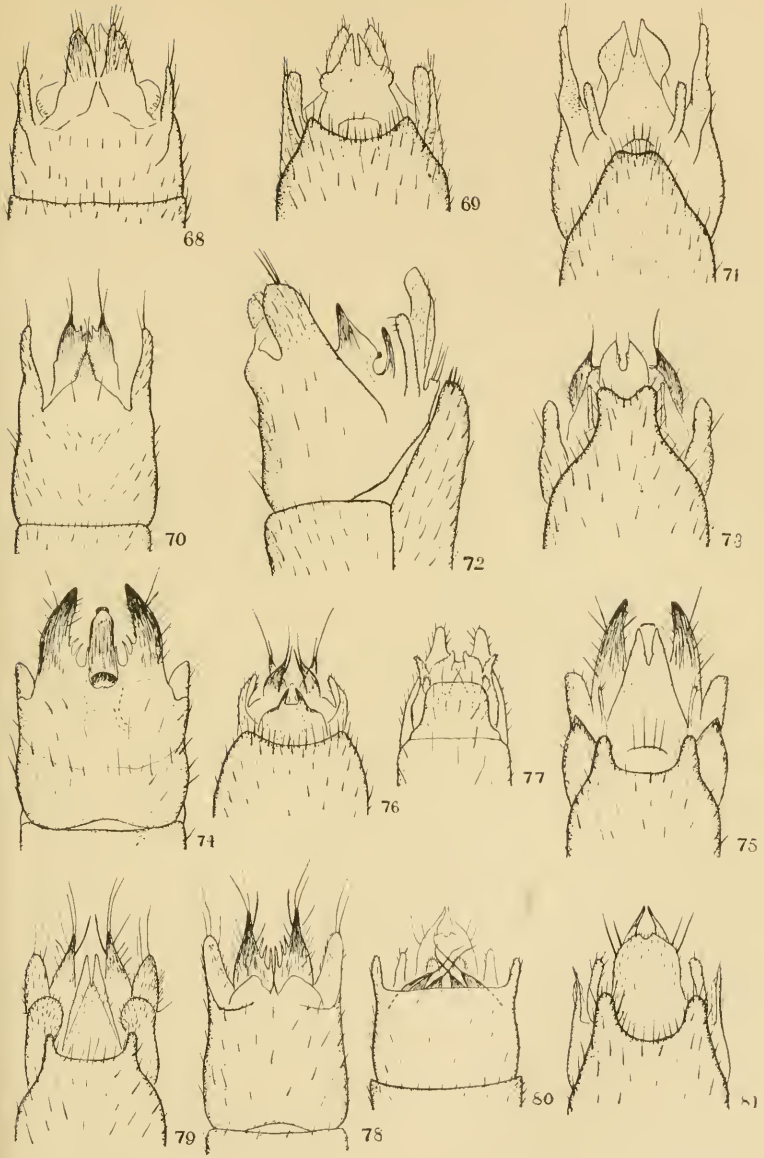

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CONTENTS OF PART I.

MEETINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON,

11 Chandos Street, Cavendish Square, W.,

FOR THE

Session 1914–1915.

Wednesday, October	... ...	7
,, ,,	... ...	21
,, November	... ...	4
,, ,,	... ...	18
,, December	... ...	2
1915.		
,, January (Annual Meeting)	... ...	20
,, February	... ...	3

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THE

TRANSACTIONS

OF THE

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OF

LONDON

FOR THE YEAR

1914.

PART II.

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(October 8, 1914.)

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,, ,, 1903	2 2 6	2 2 6	1 11 10
,, ,, 1904	2 11 6	2 11 6	1 18 4
,, ,, 1905	1 10 0	1 10 0	1 3 0
,, ,, 1906	2 3 0	2 3 0	1 12 6
,, ,, 1907	1 18 6	1 18 6	1 9 0
,, ,, 1908	2 5 0	2 5 0	1 13 8
,, ,, 1909	1 12 0	1 12 0	1 4 0
,, ,, 1910	2 16 6	2 16 6	2 2 6
,, ,, 1911	3 4 0	3 4 0	2 8 0
,, ,, 1912	3 15 0	3 15 0	2 16 3
,, ,, 1913, Part I	0 12 6	0 12 6	0 9 6
,, ,, 1913, Part II	0 13 6	0 13 6	0 10 3
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VIII. *Descriptions of South American* Micro-Lepidoptera.

By Edward Meyrick, B.A., F.R.S.

[Read April 1st, 1914.]

The following species all belong to the family *Gelechiadae*; they are principally from the low-lying forest regions of British Guiana. The types are in my own collection; 17 genera and 106 species are described as new.

Aristotelia paterata, n. sp.

♂♀. 9–10 mm. Head light brownish-ochreous. Palpi whitish, second joint with two brownish-ochreous bands, terminal joint longer, with four more or less developed sometimes indistinct dark fuscous bands. Thorax ochreous-brownish sprinkled with dark fuscous. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen very obliquely rounded; 6 separate; ochreous-brown; costal edge suffused with dark fuscous; a small basal patch of grey irroration, edge oblique; two oblique fasciae of grey irroration edged with ochreous-whitish from $\frac{1}{4}$ and middle of costa, first edged anteriorly with some black scales on upper $\frac{2}{3}$, second suffusedly connected with first on dorsum, its anterior edge with a central emargination bearing the black first discal stigma; second discal stigma elongate, black, edged beneath with white, connecting preceding fascia with anterior angle of an inwards-oblique rhomboidal pale ochreous blotch on costa towards apex, followed on costa by a blackish dot; apical and terminal edge marked with several undefined whitish dots separated with some blackish scales: cilia pale ochreous, above apex with a dark fuscous patch, on tornus greyish. Hind-wings dark grey; cilia grey.

British Guiana, Bartica, from December to February (*Parish*); fourteen specimens. This and the two following belong to the group of *fungivorella*.

Aristotelia rhodocosma, n. sp.

♀. 10 mm. Head ochreous-whitish sprinkled with dark grey. Palpi thickened with scales, those of second joint somewhat expanded at apex above, whitish, second and terminal joints each with

four rings of dark grey irroration. Thorax whitish mixed with dark grey and blackish. Abdomen dark grey. Forewings elongate, very narrow, costa gently arched, apex pointed, termen faintly sinuate, extremely oblique; 6 separate; brown; a whitish patch sprinkled with dark grey occupying basal third, outer edge somewhat oblique, enclosing an irregular blackish blotch extending on dorsum from base to $\frac{1}{4}$ and reaching more than half across wing; an irregular somewhat oblique median fascia of dark grey and white irroration, its margins irregularly marked with crimson; apical fourth of wing irregularly spotted with crimson, surrounded with some dark grey and white irroration: cilia pale ochreous, on tornus greyish, with dark brown basal line on costa becoming postmedian on termen, outer portion of costal cilia dark fuscous, basal third of terminal cilia crimson-pink barred with dark fuscous. Hind-wings and cilia dark grey.

British Guiana, Bartica, in February (*Parish*); one specimen.

Aristotelia subrosea, n. sp.

♀. 8 mm. Head, thorax, and abdomen grey. Palpi white, second joint blackish except apex, terminal joint with three blackish rings. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; 6 separate; dark slaty-grey; three oblique black streaks from costa near base, at $\frac{1}{6}$, and $\frac{1}{3}$ respectively, reaching $\frac{3}{4}$ across wing, third strongest, second and third connected beneath by an irregular subdorsal brownish-ochreous streak, its extremities terminated with rosy-whitish; discal stigmata elongate, black, second edged above and beneath by small round ochreous spots; a spot of blackish suffusion on costa at $\frac{2}{3}$; a whitish-rosy spot on tornus and a smaller one on costa beyond it, connected in disc by a longitudinal black dash: cilia pale ochreous with blackish antemedian and grey postmedian lines, basal portion spotted on termen with whitish-rosy, on tornus light greyish. Hind-wings and cilia grey.

British Guiana, Bartica, in January (*Parish*); three specimens.

Elasiprora, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{3}{4}$, in ♂ serrulate, minutely ciliated, basal joint moderately elongate, without pecten. Labial palpi long, recurved, second joint somewhat thickened, slightly roughened beneath towards apex, terminal joint as long as second, moderately acute. Maxillary palpi very short,

filiform, appressed to tongue. Posterior tibiae clothed with long fine hairs above. Fore-wings with 1*b* simple, 2 from angle, 3 absent, 7 absent, 11 from middle. Hind-wings under 1, narrow-trapezoidal, apex somewhat produced, pointed, termen somewhat emarginate beneath it, oblique, cilia 2; cell rather wide, transverse vein absent, 3 and 4 connate, 5 nearly approximated to 4 at base, 6 and 7 stalked, 6 to apex.

Probably a derivative of the *Recurvaria* group.

Elasiprora rostrifera, n. sp.

♂ ♀. 7–8 mm. Head and thorax brownish-ochreous, with a white line above eyes and along inner edge of patagia, face whitish. Palpi whitish, second joint with black line on outer side and subapical ring, terminal joint with black line on each side. Abdomen grey, anal tuft ochreous-whitish. Fore-wings elongate, narrow, costa slightly arched, apex tolerably pointed, termen very obliquely rounded; light ochreous-brown; costa suffused with black, cut by very oblique white strigulae from before middle and at $\frac{3}{4}$; a slender black median streak from base to middle, its apex dilated and sending an oblique projection upwards, edged above throughout by a white line which is extended to join similar margin of an irregular sinuate black streak from apex of wing to disc about $\frac{2}{3}$, the connecting portion also sometimes edged beneath with black irroration; a suffused white subdorsal line from base to about middle; dilation of median streak edged posteriorly with white, and sending a suffused white streak to lower part of termen, and a suffused white line surrounded with more or less black irroration to tornus: cilia whitish, with ochreous basal line sprinkled with blackish, and two apical black lines round apex and upper part of termen. Hind-wings grey; cilia ochreous-grey-whitish.

British Guiana, Bartica and Mallali, from December to April (*Parish*); twelve specimens.

Ptocheuusa hetaera, n. sp.

♂ ♀. 6–7 mm. Head ochreous-whitish, sometimes tinged with fuscous. Palpi whitish, second and terminal joints each with two blackish rings. Thorax grey. Abdomen ochreous-whitish. Fore-wings very narrowly elongate-lanceolate; grey; very oblique white strigulae from costa about $\frac{1}{4}$ and middle; a very inwards-oblique whitish strigula from dorsum before tornus, and a longitudinal one in disc above this; a round orange patch in disc at $\frac{3}{4}$, touching discal

and second costal strigulae; an oblique white strigula from costa at $\frac{3}{4}$, connected with a white dot on termen beneath it by a blue-leaden mark; a white dot on termen beyond this, and two on costa towards apex; a round black apical dot: cilia grey, towards tornus whitish-grey, round apex and termen with a blackish subbasal line indented beneath apex with projecting blackish apical hook. Hind-wings grey; cilia ochreous-grey-whitish.

British Guiana, Bartica, in February (*Parish*); four specimens.

Ptocheuusa thrombodes, n. sp.

♂ ♀. 6–7 mm. Head and thorax ochreous-whitish or whitish-ochreous, somewhat sprinkled with grey or dark grey. Palpi whitish, a subapical ring of second joint and two broader rings of terminal joint blackish, second joint with rough projecting scales beneath towards apex. Abdomen ochreous-whitish more or less suffused with grey. Fore-wings elongate, narrow, costa posteriorly gently arched, apex pointed, termen very obliquely rounded; whitish-ochreous or whitish, more or less sprinkled with grey or blackish; three blackish spots on costa near base, at $\frac{1}{3}$, and $\frac{2}{3}$, and three in disc obliquely beyond these respectively, last two discal elongate, last largest; a blackish dot on fold before second discal spot, and a cloudy spot on tornus; a small cloudy black apical spot, and sometimes a dot on costa above it: cilia ochreous-whitish or grey-whitish, base sprinkled with blackish, round apex and upper part of termen with a strong line of black irroration. Hind-wings rather dark grey, thinly scaled in disc; cilia light grey or whitish-grey.

British Guiana, Bartica and Mallali, in February and March (*Parish*); eighteen specimens.

Epithectis consociata, n. sp.

♂. 8 mm. Head and thorax ochreous-whitish tinged with grey. Palpi whitish, second joint with basal half and a subapical ring blackish, terminal joint with two blackish rings. Fore-wings elongate, narrow, costa slightly arched, apex tolerably pointed, termen extremely obliquely rounded; whitish, sprinkled with grey, and irregularly spotted with light yellowish suffusion; an oblique blackish dot beneath fold at $\frac{1}{4}$, and a small blackish spot on dorsum slightly before it; discal stigmata black, and small oblique-triangular blackish spots on costa above them; black dots near dorsum beneath these stigmata, second connected with a small blackish tornal spot; a black dot towards termen in middle; some black dots round

apical portion of costa and termen: cilia grey-whitish, greyer towards tornus, round apex sprinkled with dark grey. Hind-wings rather dark grey, in disc anteriorly and towards dorsum subhyaline; cilia grey.

British Guiana, Bartica, in January (*Parish*); one specimen.

Recurvaria nothostigma, n. sp.

♂. 7–8 mm. Head and thorax ochreous-whitish, more or less speckled with grey. Palpi whitish, second and terminal joints each with base and two bands pale ochreous irrorated with blackish. Abdomen grey, anal tuft whitish-ochreous. Fore-wings elongate, narrow, costa slightly arched, apex pointed, termen faintly sinuate, very oblique; whitish closely irrorated with grey; markings dark grey sprinkled with black and indistinctly edged with yellowish suffusion and posteriorly with whitish; spots on costa near base, before middle, at $\frac{2}{3}$, and a longer one towards apex, first connected with base by a subcostal dash; dots in disc at $\frac{1}{4}$ and middle, first connected with dorsum by an obscure yellowish-grey bar, second with an indistinct spot beneath and slightly before it; a triangular spot on tornus opposite third costal spot, followed by a roundish grey patch including a minute black dot; an irregular suffused spot within apex: cilia grey finely sprinkled with whitish. Hind-wings grey, paler anteriorly; cilia grey.

British Guiana, Bartica and Mallali, from January to March (*Parish*); six specimens.

Compsosaris, n. g.

Head smooth; ocelli absent; tongue developed. Antennae $\frac{5}{6}$, in ♂ simple, basal joint long, without pecten. Labial palpi very long, curved, ascending, second joint above with scales expanded at apex, beneath with long rough projecting hair-scales throughout and denser projecting apical tuft, terminal joint shorter than second, slender, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with 1*b* furcate, 2 from towards angle, 3–5 approximated at base, 6 near 7, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings $\frac{3}{4}$, narrow-trapezoidal, apex produced, termen obliquely bisinuate, cilia 3; 3 and 4 rather remote, 5 approximated to 4 at base, 6 and 7 nearly parallel, transverse vein very oblique inwards from 6 to 7.

Apparently allied to *Recurvaria*, notwithstanding the considerable differences.

Compsosaris testacea, n. sp.

♂♀. 8–9 mm. Head, thorax, and abdomen ochreous-whitish. Palpi whitish, second joint with two ochreous bands, terminal joint with two dark fuscous rings. Fore-wings elongate, narrow, costa slightly arched, apex tolerably pointed, termen very obliquely rounded; ochreous-whitish; three oblique wedge-shaped ochreous-brown or deep yellow-ochreous patches on costa, blackish on costal margin, first towards base, less marked, second before middle, third about $\frac{3}{4}$, sometimes extended almost to termen, and marked in disc with a fine black dash, two latter edged posteriorly by clear white strigulae; discal stigmata black; a suffused ochreous spot on fold at $\frac{1}{4}$, a larger one beneath first discal, and one more elongate and distinct between first and second discal; a triangular grey tornal spot beneath second discal, edged anteriorly with some black scales; apical portion of costa suffused with ochreous: cilia light greyish, round apex ochreous with three or four fine blackish lines. Hind-wings and cilia grey.

British Guiana, Bartica, in January and February (*Parish*); nine specimens.

Dissoptila, n. g.

Head smooth; ocelli absent; tongue developed. Antennae $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi very long, recurved, slender, second joint with scales roughened towards apex beneath, terminal joint much longer than second, slender, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae densely clothed with rough hairs. Fore-wings with two large scaletufts in disc anteriorly; 1*b* furcate, 2 from $\frac{2}{3}$, 4 and 5 connate from angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings under 1, elongate-trapezoidal, apex rather produced, pointed, termen obliquely emarginate, cilia 2; 3 and 4 connate, 5 approximated, 6 and 7 rather approximated towards base, transverse vein inwardly oblique from 6 to 7.

Type *D. mutabilis*.

Dissoptila asphaltitis, n. sp.

♀. 9 mm. Head and thorax dark ashy-grey with blue reflections. Palpi ochreous-whitish. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; dark violet-grey; a narrow ochreous-yellow fascia near base, with projections outwards on costa and in disc,

anteriorly blackish-edged on costa; two blackish tufts rather obliquely placed in disc about $\frac{1}{3}$: cilia dark grey, paler towards tips. Hind-wings dark grey; cilia as in fore-wings.

British Guiana, Bartica, in February (*Parish*); one specimen.

Dissoptila prozona, n. sp.

♂. 7 mm. Head dark fuscous, face and palpi ochreous-whitish. Thorax dark fuscous, sides and posterior margin whitish-ochreous. Abdomen grey. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; rather dark fuscous, with faint purplish tinge; a broad whitish-ochreous fascia near base, edges straight; two large blackish tufts rather obliquely placed in disc at $\frac{1}{3}$; a whitish-ochreous dot on middle of costa, one in disc rather beyond this, and an inwardly oblique strigula from costa at $\frac{2}{3}$; a slender somewhat incurved whitish-ochreous fascia from $\frac{3}{4}$ of costa to tornus, narrowly interrupted in middle and with narrow projections inwards on each side of this: cilia lilac-grey. Hind-wings dark grey, subhyaline in disc anteriorly; cilia grey.

British Guiana, Bartica, in February (*Parish*); one specimen.

Dissoptila mutabilis, n. sp.

♂ ♀. 9–10 mm. Head ochreous-whitish. Palpi white, faintly greyish-tinged beneath apex of second and terminal joints. Thorax whitish-ochreous, shoulders and anterior half of dorsum dark fuscous, apex of patagia sometimes ferruginous-yellow. Abdomen grey. Fore-wings elongate, narrow, costa slightly arched, apex pointed, termen extremely obliquely rounded; pale yellowish-ochreous or whitish-ochreous, sometimes only faintly clouded with darker, often more or less wholly suffused with grey or dark grey irroration; basal area sometimes mixed with ferruginous-yellow; two large blackish tufts transversely placed in disc at $\frac{1}{3}$; often longitudinal grey marks on costa before middle and about $\frac{2}{3}$; cilia grey or dark grey, more or less suffused with ochreous-whitish or whitish-ochreous towards base. Hind-wings rather dark grey, paler and thinly scaled in disc anteriorly; cilia grey.

British Guiana, Bartica and Mallali, in February and March (*Parish*); twenty-eight specimens.

Dissoptila disrupta, n. sp.

♂ ♀. 9–10 mm. Head and palpi ochreous-whitish. Thorax ochreous-whitish, shoulders and anterior half of dorsum suffusedly

irrorated with blackish, posterior half of dorsum variably dotted with blackish. Abdomen grey, sides whitish. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; ochreous-whitish or pale whitish-ochreous; three cloudy grey spots on anterior half of costa and a patch from beyond middle to near apex; other markings formed of black irroration, viz. four irregular patches along dorsum, several irregular variable spots in disc between base and middle, an elongate patch or streak margining posterior costal patch beneath, and a streak along upper part of termen: cilia whitish-ochreous more or less suffused with grey, on termen sprinkled with blackish towards base. Hind-wings dark grey, thinly scaled in disc anteriorly; cilia rather dark grey.

British Guiana, Bartica, in February (*Parish*); ten specimens.

Telphusa callitechna, n. sp.

♂. 12–13 mm. Head ochreous-whitish, sometimes variably mixed with dark fuscous. Palpi whitish, irregularly mixed and suffused with blackish. Thorax brownish-ochreous irregularly mixed and suffused with black. Abdomen dark fuscous. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; dark fuscous; extreme base irregularly marked with white, pale ochreous, bluish-grey, and black; a fine bisinuate white line from $\frac{1}{4}$ of costa to dorsum before middle, anteriorly edged with blackish suffusion, posteriorly followed by a broad band of variable ochreous-whitish, bluish-lilac, and yellowish suffusion, posteriorly undefined; a transverse tuft of scales in disc before middle, and one on fold beneath middle; a blackish pale-edged dot towards costa beyond middle; a bluish-lilac spot towards tornus, preceded by an ochreous-yellowish tuft; an ochreous-whitish subtriangular spot on costa beyond $\frac{3}{4}$; some pale ochreous and lilac suffusion on lower part of termen: cilia irregularly barred or spotted with dark fuscous and ochreous-whitish, towards tornus greyish. Hind-wings dark grey, thinly scaled and subhyaline in disc anteriorly; cilia grey.

British Guiana, Bartica and Mallali, from January to March (*Parish*); four specimens.

Parastega ochropis, n. sp.

♀. 18–19 mm. Head whitish-ochreous. Palpi whitish-ochreous, terminal joint dark fuscous except base and apex. Thorax dark fuscous. Abdomen rather dark grey. Fore-wings elongate, narrow, costa gently arched, apex obtuse, termen very obliquely rounded;

dark purplish-fuscous; a narrow-transverse somewhat oblique white spot from costa at $\frac{1}{4}$, nearly reaching fold; plical and second discal stigmata obscurely darker, approximated, edged laterally with white dots; a semicircular white spot on costa before $\frac{3}{4}$: cilia dark grey. Hind-wings rather dark grey; cilia grey.

Ecuador, Quevado; Dutch Guiana, Paramaribo, in December; two specimens.

Thiotricha argoxantha, n. sp.

♂ ♀. 7–9 mm. Head, palpi, and thorax silvery-white. Abdomen grey, anal tuft large, whitish. Fore-wings elongate, narrow, costa hardly arched, apex tolerably pointed, termen obliquely rounded; silvery-white, sometimes ochreous-tinged; an orange praeapical patch resting on costa but not quite reaching apex, termen, or dorsum, anterior edge strongly convex and reaching to before $\frac{3}{4}$ of wing, preceded by grey suffusion which is stronger and darker towards costa, and indents it just below costa; sometimes a short orange mark on tornus touching this; a round black apical dot: cilia whitish, tinged with orange towards termen, above apex with two dark fuscous hooks, beneath apex with two indistinct grey lines. Hind-wings with apex very long-produced; grey, paler towards base; cilia whitish-grey, opposite apex with two short dark grey lines.

British Guiana, Bartica, Georgetown, and Mallali, from December to April (*Parish*); seven specimens.

Anterethista, n. g.

Head smooth; ocelli absent; tongue developed. Antennae $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi very long, recurved, slender, second joint with scales somewhat expanded towards apex above, terminal joint longer than second, acute. Maxillary palpi minute, filiform, appressed. Posterior tibiae with appressed hairs above. Fore-wings with 1*b* furcate, 2 from towards angle, 7 absent, 11 from $\frac{2}{3}$. Hind-wings 1, elongate-trapezoidal, apex tolerably pointed, termen somewhat sinuate beneath apex, cilia 3; 3 and 4 rather approximated towards base, 5 nearly parallel, 6 absent, 7 to apex.

A development of *Commatica*.

Anterethista heteractis, n. sp.

♂ ♀. 7–8 mm. Head, thorax, and abdomen dark grey, face whitish. Palpi whitish, second joint streaked with dark fuscous

towards apex, anterior edge of terminal joint blackish. Fore-wings elongate, narrow, costa gently arched, apex pointed, termen very obliquely rounded; dark glossy grey, becoming dark bronzy-fuscous on posterior $\frac{2}{3}$; a wedge-shaped oblique white streak from costa beyond middle; a white dot in disc beneath its apex: cilia grey, with two dark grey shades, on costa white with three oblique dark fuscous lines converging towards apex. Hind-wings and cilia dark fuscous.

British Guiana, Bartica and Mallali, in February and March (*Parish*); four specimens.

Commatica, Meyr.

Apopira, Wals. (Biol. Centr. Am. IV, p. 73) is a synonym of this, and perhaps *Simoneura*, Wals. (l. c. p. 72) also.

Commatica acropelta, n. sp.

♂♀. 9–10 mm. Head, thorax, and abdomen dark fuscous. Palpi whitish, second joint very finely ribbed with grey, terminal joint with anterior edge and extreme base blackish. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen obliquely rounded; dark fuscous; a fine white oblique strigula from $\frac{3}{4}$ of costa almost to termen above middle, apical area beyond this light brownish-ochreous, with four white marginal dots: cilia fuscous with two dark fuscous shades, on costa with two white spots on marginal dots. Hind-wings dark fuscous, rather lighter towards base; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from January to March (*Parish*); five specimens.

Commatica metochra, n. sp.

♂♀. 9–10 mm. Head and thorax light ochreous-grey. Palpi ochreous-grey, apical edge of second joint white, terminal joint whitish, anterior edge black. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly arched, apex obtuse-pointed, termen slightly rounded, rather strongly oblique; brownish-ochreous sprinkled with dark fuscous; a dark fuscous streak along costa from base to subterminal line; stigmata dark fuscous, plical obliquely before first discal, second discal usually obsolete; a straight direct ochreous-white subterminal line from $\frac{3}{4}$ of costa to dorsum before tornus, edged anteriorly with dark fuscous suffusion; apical area beyond this yellow-ochreous, mixed with whitish between

veins, and towards margin with some black specks sometimes forming short dashes; three or four black marginal dots round apex and termen: cilia fuscous, basal third ochreous. Hind-wings dark grey; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, in February and March (*Parish*); eight specimens.

Commatica lupata, n. sp.

♂♀. 8–10 mm. Head and thorax pale ochreous. Palpi white, second joint ochreous-grey except apex. Abdomen dark grey, anal tuft whitish-ochreous. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen obliquely rounded; pale ochreous, brownish-tinged posteriorly, suffused with ochreous-whitish towards costa anteriorly; costal edge black towards base; a dark fuscous dot or oblique mark beneath fold before $\frac{1}{4}$; plical and first discal stigmata blackish, plical very obliquely before first discal, both sometimes merged in a very oblique dark fuscous mark; a thick black streak along costa from before middle to apex, attenuated anteriorly, cut by a very oblique fine white strigula from $\frac{3}{4}$; sometimes some fuscous suffusion along fold posteriorly; a fine black dash in disc about $\frac{4}{5}$, sometimes anteriorly extended and rather curved downwards; a stronger black dash above tornus, sometimes connected with tornus by fuscous suffusion; a dentate whitish line just before termen, terminal interstices speckled with blackish: cilia ochreous-whitish, towards base pale ochreous, on costa with dark fuscous subbasal line becoming fuscous or faint on termen, and blackish-grey shade on tips rather projecting at apex. Hind-wings dark fuscous; cilia grey, darker towards base, at apex with subbasal dark fuscous mark.

British Guiana, Bartica, from December to April (*Parish*); nine specimens.

Commatica nerterodes, n. sp.

♀. 9 mm. Head, thorax, and abdomen dark fuscous, face lighter. Palpi whitish, second joint finely ribbed with blackish irroration, anterior edge of terminal joint black. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; dark purplish-grey; a thick blackish costal streak from near base to apex, cut at $\frac{1}{3}$ by an oblique mark of ground colour sprinkled with whitish, and by oblique white strigulae beyond middle and at $\frac{3}{4}$, from second of which a fine strongly curved whitish subterminal line runs to tornus; an oblique mark across

fold at ¼ and stigmata obscurely blackish, indistinct, second discal edged with two or three white scales; some whitish irroration towards dorsum beyond middle, and between subterminal line and termen; a white dot on costa towards apex: cilia grey, paler towards tips, on costa with two dark fuscous lines separated with whitish. Hind-wings dark fuscous; cilia dark grey.

British Guiana, Bartica, in February (*Parish*); one specimen.

Commatica emplasta, n. sp.

♂♀. 9–10 mm. Head and thorax pale grey. Palpi grey or dark grey, terminal joint and apex of second whitish. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, apex obtuse-pointed, termen very obliquely rounded; purplish-grey irrorated with dark fuscous, more or less variably mixed or suffused with pale greyish-ochreous except towards costa and dorsum, costa suffused with dark fuscous; a small dark fuscous spot on fold before ¼; stigmata represented by similar spots, plical obliquely before first discal; a fine oblique white strigula from costa at ¾; a black mark along apical part of costa, and four black dots or groups of scales along termen: cilia greyish, on costa more or less whitish with two thick dark fuscous lines. Hind-wings grey, darker posteriorly, with fringe of long hairs from lower margin of cell; cilia grey, at apex with darker basal dot.

British Guiana, Bartica and Mallali, from January to March (*Parish*); twelve specimens.

Commatica chionura, n. sp.

♂♀. 9–10 mm. Head and thorax dark grey, lower part of face suffused with whitish. Palpi white, second joint suffused with grey towards apex, hairs largely expanded above, terminal joint with anterior edge sprinkled with blackish. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, apex pointed, termen sinuate beneath apex, obliquely rounded; dark violet-grey becoming blackish posteriorly; stigmata cloudy, blackish, sometimes more or less absorbed in the blackish suffusion, plical obliquely before first discal; a very oblique white strigula from costa at ⅔, whence a faint interrupted whitish line runs to near termen beneath apex, thence curved very near termen to tornus; a brown mark along costa beyond this, terminated by a white praeapical dot: cilia white, on tornus grey becoming blackish towards base, on costa dark fuscous with white mark on praeapical dot, at apex forming a falcate projection with black basal line. Hind-wings 1,

apex somewhat produced, obtuse-pointed, termen sinuate beneath apex; dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); four specimens.

Commatica parmulata, n. sp.

♂. 11 mm. Head and thorax dark grey. Palpi white, finely ribbed throughout with black. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen very obliquely rounded; dark violet-fuscous, suffused in disc with light glossy blue; an oblique blackish mark beneath fold at $\frac{1}{4}$; stigmata large, elongate, blackish, plical obliquely before first discal, some white irroration above and below second discal; a very oblique white strigula from costa before $\frac{2}{3}$, whence a very strongly curved fine whitish line runs to tornus; a leaden-grey terminal patch extending to second discal stigma and cut by this line, marked before apex by a white spot cut by two black dashes and surrounded by some white irroration: cilia grey, on termen sprinkled with white and with a fine white median line, on costa dark fuscous, at apex with a projection formed by two slightly curved depressed black lines. Hind-wings 1, apex obtuse, termen slightly sinuate; dark fuscous; cilia rather dark violet-grey.

British Guiana, Bartica, in February (*Parish*); one specimen.

Commatica cyanorrhoa, n. sp.

♂ ♀. 14–16 mm. Head and thorax dark indigo-blue-grey. Palpi dark fuscous, finely ribbed throughout with white. Abdomen dark fuscous. Fore-wings elongate, narrow, costa gently arched, apex tolerably pointed, termen somewhat sinuate just beneath apex, very obliquely rounded; dark violet-fuscous, dorsal half suffused with glossy blue; stigmata obscure, dark fuscous, plical very obliquely before first discal; a fine very oblique white strigula from costa before $\frac{2}{3}$, continued faintly to near apex, costal area beyond this suffused with blackish; a small blackish apical spot: cilia dark grey, with subfalcate apical projection formed by three blackish nearly straight lines suffused beneath with white, on termen sprinkled with white at base and with a subbasal white line. Hind-wings over 1, apex obtuse, termen not sinuate; dark fuscous; cilia grey, darker towards base, in ♂ white round dorsal region.

British Guiana, Bartica and Mallali, from December to March (*Parish*); twenty-four specimens. Extremely like

falcatella, Walk. (which occurred with it), but larger, apical projection of cilia of fore-wings formed by nearly straight lines (whereas in *falcatella* they are strongly curved, falcate), tornal cilia of hind-wings in ♂ white (in *falcatella* grey).

Eripnura, n. g.

Head smooth; ocelli absent; tongue absent. Antennae $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, recurved, rather thickened with appressed scales throughout, terminal joint shorter than second, pointed. Maxillary palpi rudimentary. Posterior tibiae with long hairs above. Fore-wings with 2 from towards angle, 7 absent, 11 from middle. Hind-wings 1, trapezoidal, apex obtuse, termen hardly sinuate, cilia $\frac{3}{4}$; 3 and 4 connate, 5 parallel, 6 and 7 rather approximated towards base.

Allied to *Commatica*, but differing in palpi, and apparently by absence of tongue.

Eripnura criodes, n. sp.

♂ ♀. 13 mm. Head, palpi, thorax, and abdomen dark ashy-fuscous. Fore-wings elongate, narrow, posteriorly slightly dilated, costa faintly sinuate, apex obtuse, termen slightly rounded, rather oblique; dark purplish-fuscous or ashy-fuscous, sometimes slightly whitish-sprinkled; an elongate brown patch towards apex, reaching costa above apex, terminated beneath this by a pale leaden-metallic apical spot edged with a black mark anteriorly and suffusedly extended along upper part of termen, preceded by a few whitish scales; a fine series of white scales just below costa from $\frac{4}{5}$ to the black mark: cilia dark fuscous, on termen tinged with leaden-metallic towards base, at apex with a depressed subfalcate brownish projection suffused with white beneath and containing two dark lines from costa. Hind-wings dark fuscous; cilia grey, darker towards base, on upper part of termen with outer $\frac{2}{3}$ whitish.

British Guiana, Bartica, in January and February (*Parish*); three specimens.

Calliprora, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint somewhat thickened with appressed scales, terminal joint longer than second, slender, acute. Maxillary palpi very short, filiform, appressed to tongue.

Posterior tibiae with appressed scales, with whorls of projecting scales on origin of spurs. Fore-wings with 1*b* furcate, 2 from $\frac{3}{4}$ of cell, 7 absent, 11 from middle. Hind-wings 1, elongate-trapezoidal, apex pointed, produced, termen concave beneath apex, cilia 1; 3 and 4 connate, 5 rather approximated, 6 and 7 connate

Type *C. pentagramma.* Allied to *Commatica* and *Eripnura*, but differing from both in palpi.

Calliprora pentagramma, n. sp.

♂ ♀. 10–12 mm. Head ochreous-whitish, crown with two dark fuscous stripes. Palpi ochreous-whitish, anterior edge black. Thorax blackish, with five ochreous-whitish stripes. Abdomen blackish. Fore-wings elongate, rather narrow, posteriorly dilated, costa slightly sinuate, gently arched towards apex, apex pointed, strongly produced, termen deeply concave beneath apex, then rounded, hardly oblique; purple-blackish; basal area crossed by five longitudinal ochreous-whitish streaks becoming longer upwards, uppermost nearly reaching middle but obsolete towards base, a short ochreous-whitish mark also on dorsal edge about $\frac{1}{4}$; a rather oblique slightly curved ochreous-whitish streak from before middle of dorsum, attenuated upwards, reaching $\frac{2}{3}$ across wing; a transverse series of six short longitudinal ochreous-whitish lines on veins about $\frac{3}{4}$, becoming longer downwards, and a seventh on dorsum; a coppery-metallic transverse line from $\frac{1}{5}$ of costa to tornus, obtusely angulated above middle, extremities whitish; a fulvous streak just beyond this, sending a branch into apical projection, lower portion terminal: cilia on termen purple-coppery-metallic, on costa dark fuscous with two white marks, at apex with a blackish basal line edged with whitish, and falcate projection. Hind-wings and cilia dark fuscous.

British Guiana, Bartica and Mallali, from December to March (*Parish*); eighteen specimens.

Calliprora trigramma, n. sp.

♂. 10 mm. Differs from *pentagramma* in having apex of fore-wings more strongly and slenderly produced, termen vertical, basal area with only three longitudinal stripes (two median, one subdorsal), antemedian streak from dorsum enlarged into an acute-triangular blotch reaching $\frac{3}{4}$ across wing, anterior edge angulated towards dorsum.

British Guiana, Bartica, in February (*Parish*); one specimen.

Hapalonoma, n. g.

Head smooth; ocelli present; tongue developed. Antennae almost 1, in ♂ simple, basal joint elongate, without pecten. Labial palpi very long, recurved, second joint expanded with rough hairs above towards apex, beneath with fringe of long rough projecting hairs, terminal joint longer than second, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with 1*b* furcate, 2 from towards angle, 6 to apex, 7 absent, 11 from beyond middle. Hind-wings 1, elongate-trapezoidal, apex rounded, termen hardly sinuate, cilia over 1; 3 and 4 connate, 5 rather approximated, 6 and 7 closely approximated towards base.

Hapalonoma argyracta, n. sp.

♂ ♀. 9–10 mm. Head and thorax whitish. Palpi white, towards base grey. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, apex rounded-obtuse, termen rounded, somewhat oblique; white or ochreous-whitish, with some scattered dark fuscous scales; a blackish streak along basal third of costa; elongate blackish costal marks beyond middle and at $\frac{3}{4}$, latter edged beneath with ferruginous; a dark fuscous dot above middle of disc, sometimes with some dark suffusion round it; some variable dark fuscous suffusion or irroration towards dorsum, in one specimen forming distinct spots at $\frac{1}{3}$ and middle; a silvery-metallic subdentate submarginal line round posterior part of costa and termen, preceded by an angulated whitish line and then by a band of light brownish suffusion, with an interrupted black dash on angle of line, costa and apex beyond this ferruginous: cilia grey, towards tornus whitish, round costa and apex with a sharp blackish subbasal line, base within this light ferruginous. Hind-wings dark grey; cilia grey, round apex with base whitish.

British Guiana, Bartica, in December and January (*Parish*); four specimens.

Ethirostoma, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi very long, recurved, second joint clothed above with dense scales expanded towards apex, and beneath tufted with long rough projecting scales, terminal joint as long as second, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with 1*b* furcate, 2 from

towards angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings 1, elongate-trapezoidal, apex obtuse-pointed, termen hardly sinuate, cilia over 1; a fringe of long hairs from lower margin of cell towards base; 3 and 4 connate, 5 nearly parallel, 6 and 7 closely approximated towards base.

A development of *Battaristis*.

Ethirostoma semiacma, n. sp.

♂ ♀. 8–10 mm. Head and thorax in ♂ grey-whitish, in ♀ grey, face more or less whitish-suffused, shoulders marked with dark fuscous. Palpi white, more or less distinctly barred with grey. Abdomen in ♂ grey, in ♀ dark grey. Fore-wings elongate, narrow, costa gently arched, apex obtuse, termen obliquely rounded; purplish-fuscous, more or less suffusedly irrorated with white; a dark fuscous erect mark from base of dorsum; an irregular dark fuscous spot beneath costa at $\frac{1}{5}$; a dark fuscous transverse streak from dorsum at $\frac{1}{4}$, reaching half across wing, posteriorly edged with white; a thick black streak along costa from before middle to near apex, cut by two very oblique white strigulae from beyond middle and at $\frac{2}{3}$; stigmata dark fuscous, plical obliquely before first discal, followed by a raised white spot, first discal indistinct, second enlarged into an irregular spot followed by a whitish tuft; an irregular elongate ochreous-white apical blotch, from anterior extremity of which a faint dentate whitish line runs to tornus; a leaden-grey spot adjoining apical blotch beneath: cilia dark fuscous irrorated with white points, beneath apex with a white spot, on costa with a fine white subbasal line. Hind-wings in ♂ grey, in ♀ dark grey, thinly scaled towards base; cilia in ♂ pale grey, in ♀ grey.

British Guiana, Bartica and Mallali, from January to March (*Parish*); eighteen specimens.

Battaristis, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi very long, recurved, thickened with appressed scales, anterior edge hardly roughened, second joint with scales somewhat expanded at apex above, terminal joint as long as second, pointed. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with 1*b* furcate, 2 from $\frac{4}{5}$–$\frac{5}{6}$, 6 sometimes to apex, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings 1, elongate-trapezoidal, apex obtuse, termen faintly sinuate, cilia 1; 3 and 4 connate, 5 somewhat approximated, 6 and

7 closely approximated towards base; a fringe of long hairs from lower margin of cell towards base covering submedian fold.

Type *B. ichnota*. Allied to *Anacampsis*, but differing by the palpi. To this genus belong *emissurella*, Walk., and several of the species referred by Lord Walsingham to *Untomia*, as *symphora*, Wals., and the North American *nigratomella*, Clem., and *concinnella*, Chamb.

Battaristis prismatopa, n. sp.

♂. 10 mm. Head and thorax whitish-ochreous. Palpi with second joint ochreous finely irrorated with blackish, becoming black towards apex, apical edge white, terminal joint whitish, extreme base black. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, apex obtuse, termen very obliquely rounded; whitish-ochreous, with a few scattered dark fuscous scales posteriorly; plical and second discal stigmata dark fuscous; a blackish-fuscous streak along costa from before middle to near apex, cut by a very oblique white strigula beyond middle; a fine white subterminal line from $\frac{3}{4}$ of costa to tornus, rather acutely angulated in middle, upper half faintly curved outwards, followed by brownish suffusion, lower straight; a small black rhomboidal spot on termen beneath apex, edged with some whitish suffusion: cilia grey, whitish towards base, with dark fuscous basal line, and on costa with dark fuscous posterior line. Hind-wings dark grey; cilia grey, darker towards base.

British Guiana, Bartica, in January (*Parish*); one specimen.

Battaristis orthocampta, n. sp.

♂. 9–10 mm. Head light greyish-ochreous or grey. Palpi dark fuscous, extreme apical edge of second joint white, terminal joint whitish, extreme base black. Thorax greyish-ochreous or grey, posterior edge dark fuscous. Abdomen dark fuscous. Fore-wings elongate, narrow, costa gently arched, apex obtuse, termen very obliquely rounded; grey or pale greyish-ochreous, somewhat tinged with fuscous towards dorsum; a black dot beneath fold at $\frac{1}{4}$; plical and second discal stigmata blackish; a thick blackish streak along costa from $\frac{2}{5}$ to apex, attenuated anteriorly, cut by a fine white very oblique strigula from costa beyond middle; a fine black dash in disc beyond second discal stigma, not reaching subterminal line; sometimes a blackish mark on dorsum before subterminal line; a fine whitish subterminal line from $\frac{3}{4}$ of costa to tornus, right-angled in middle, both portions straight; a white bar connecting angle of

this line with termen beneath apex, including a fine black strigula posteriorly; terminal area beneath this fuscous irrorated with whitish; a minute whitish dot on costa near apex: cilia fuscous irrorated with whitish, on costa dark fuscous, at apex with a slightly projecting blackish line. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from January to March (*Parish*); eleven specimens.

Battaristis ardiophora, n. sp.

♂ ♀. 8–9 mm. Head whitish-ochreous, sides of face suffused with fuscous. Palpi grey, extreme apical edge of second joint white edged beneath with black, terminal joint white with extreme base black, anteriorly blackish towards tip. Thorax pale ochreous, posterior extremity suffused with dark fuscous. Abdomen dark fuscous. Fore-wings elongate, narrow, costa gently arched, apex obtuse, termen obliquely rounded; pale brownish-ochreous, towards costa anteriorly whitish-ochreous; dorsum dark fuscous towards base; costal edge black from base to a small fine wedge-shaped mark at $\frac{1}{4}$; a thick dark fuscous streak along costa from $\frac{2}{5}$ to near apex, attenuated anteriorly, cut by a fine white very oblique strigula from costa beyond middle; a small obscure oblique fuscous mark beneath fold at $\frac{1}{4}$; stigmata minute, obscure, dark fuscous, plical obliquely before first discal; a fine white subterminal line from $\frac{3}{4}$ of costa to tornus, acutely angulated in middle, both halves slightly sinuate inwards, its angle just reached or hardly cut by a fine black dash preceding it, which is connected with second discal stigma by a suffused whitish dash, beneath this a minute black strigula touching line and preceded by a short whitish dash; some fuscous suffusion towards dorsum before this line; tornal area beyond this line irrorated with whitish and sometimes fuscous: cilia fuscous sprinkled with whitish, on termen brownish-ochreous towards base, on costa dark fuscous with row of whitish points and blackish-brown basal line. Hind-wings dark fuscous; cilia grey, with dark grey ubbasal shade.

British Guiana, Bartica, in February (*Parish*); two specimens.

Battaristis ichnota, n. sp.

♂ ♀. 10–11 mm. Head and thorax pale brownish-ochreous, face whitish-grey, lateral margins black, shoulders with a small black spot. Palpi black, terminal joint and extreme apical edge of second whitish. Abdomen dark grey. Fore-wings elongate, narrow, costa

gently arched, apex obtuse, termen slightly rounded, rather strongly oblique; light ochreous-brownish, towards apex light ferruginous-ochreous, somewhat mixed with whitish in disc; costal edge blackish towards base, with a black dot at base; short oblique blackish marks towards costa at $\frac{1}{5}$ and $\frac{2}{5}$, and beneath fold at $\frac{1}{4}$; stigmata black, partially edged with whitish, plical and second discal forming oblique marks, plical rather obliquely before first discal, space between stigmata suffused with fuscous; dorsum rather widely suffused with fuscous from base to subterminal line; an elongate gradually dilated wedge-shaped black patch extending along costa from $\frac{1}{3}$ to subterminal line, cut by a fine white oblique strigula from beyond middle of costa; a fine white subterminal line from $\frac{3}{4}$ of costa to tornus, acutely angulated in middle, sinuate inwards on lower half, angle interrupted by a short blackish dash projecting from dark suffusion of dorsal half of wing; some light grey dots round apical part of costa and termen: cilia dark grey finely speckled with whitish, with black basal line. Hind-wings dark fuscous, thinly scaled in disc anteriorly; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); thirty specimens.

Battaristis amphiscolia, n. sp.

♂♀. 9–10 mm. Head and thorax grey. Palpi dark fuscous, extreme apical edge of second joint white, terminal joint whitish minutely speckled with dark fuscous. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen obliquely rounded; fuscous, greyer towards costa anteriorly; plical and second discal stigmata sometimes obscurely indicated; a thick blackish streak along costa from before middle to near apex, attenuated anteriorly, cut by a very oblique fine white strigula from beyond middle; a fine white subterminal line from $\frac{4}{5}$ of costa to tornus, acutely angulated in middle and nearly reaching termen beneath apex, both portions curved inwards, angle just cut by a fine black dash preceding it; terminal space beyond this irrorated with whitish, apical edge ochreous-whitish: cilia fuscous, with rows of whitish points, on costa dark fuscous. Hind-wings dark fuscous; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica, in February (*Parish*); four specimens.

Battaristis atelesta, n. sp.

♂. 10 mm. Head and thorax dark bronzy-grey. Palpi dark fuscous, extreme apical edge of second joint white, terminal joint

white speckled with blackish, extreme base black. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen rounded, rather oblique; dark bronzy-grey; a small blackish spot on base of dorsum; a blackish spot on fold before $\frac{1}{4}$; plical and second discal stigmata black; a thick blackish streak along costa from $\frac{2}{5}$ to apex, attenuated anteriorly, cut by a very oblique fine whitish strigula from beyond middle, and by another somewhat less oblique from $\frac{3}{4}$, terminating in an undefined patch of whitish irroration near termen: cilia grey sprinkled with white, on termen with a strong white antemedian line, on costa blackish, round apex and termen with two blackish-grey posterior lines separated round costa with whitish. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); one specimen.

Battaristis melanamba, n. sp.

♂. 9 mm. Head and thorax leaden-grey. Palpi dark fuscous, apical edge of second joint whitish, terminal joint whitish sprinkled with dark fuscous. Abdomen dark fuscous. Fore-wings elongate, rather narrow, costa slightly arched, appearing faintly sinuate beyond middle, apex obtuse, termen rounded, rather oblique; leaden-grey, finely sprinkled with whitish; black dots beneath fold before $\frac{1}{4}$ and before middle; costal edge black from base to a minute black strigula at $\frac{1}{2}$; two adjacent flattened-triangular black costal patches extending from about $\frac{1}{3}$ to $\frac{4}{5}$, separated by an oblique whitish strigula; two or three indistinct minute black praemarginal dots near termen: cilia dark ashy-fuscous, with ferruginous-brown basal line, on tornus greyish. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); one specimen.

Battaristis stereogramma, n. sp.

♂♀. 10–11 mm. Head and thorax leaden-grey. Palpi dark grey, extreme apical edge of second joint whitish, terminal joint whitish irrorated with grey, extreme base dark grey. Abdomen dark fuscous. Fore-wings elongate, rather narrow, costa slightly arched, appearing faintly sinuate beyond middle, apex obtuse, termen rounded, oblique; leaden-grey, sometimes irrorated with white; a blackish spot or very oblique mark on fold about $\frac{1}{4}$; a blackish dot in middle of disc; an oblique whitish strigula from costa

before middle, edged on both sides with black, posterior edging confluent with a dark fuscous fascia preceding subterminal line, suffused anteriorly and blackish on costa; subterminal line from $\frac{3}{4}$ of costa to dorsum before tornus nearly straight, whitish; terminal area beyond this more or less whitish-irrorated, especially towards costa, with three or four more or less indistinct blackish praemarginal dots: cilia dark grey, with brown basal line, towards tornus paler. Hind-wings dark fuscous, somewhat thinly scaled in disc anteriorly; cilia grey, darker towards base.

British Guiana, Bartica, in February (*Parish*); four specimens.

Alsodryas, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint densely scaled, with strong triangular projecting tuft at apex beneath, terminal joint as long as second, thickened with scales and slightly roughened anteriorly, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with long hairs above. Fore-wings with tufts of scales on surface; 1*b* furcate, 2 from towards angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings 1, elongate-trapezoidal, apex obtuse, termen hardly sinuate, cilia $1\frac{1}{2}$; 3 and 4 connate, 5 nearly parallel, 6 and 7 closely approximated towards base.

Differs from *Agriastis* by the palpi.

Alsodryas lactaria, n. sp.

♂ ♀. 10–12 mm. Head and thorax ochreous-whitish. Palpi blackish, terminal joint and apical edge of second white. Abdomen grey. Fore-wings elongate, costa gently arched, apex obtuse, termen obliquely rounded; ochreous-whitish, more or less sprinkled or faintly clouded with pale ochreous; a black dot on base of costa and small spot at $\frac{1}{5}$, costal edge black between these; a black subbasal dot near costa; a slight suffused blackish wedge-shaped mark on costa before middle, and a larger one beyond middle; a rather large transverse tuft of blackish-grey scales in disc slightly before middle, and one somewhat smaller at $\frac{2}{3}$; blackish-grey spots on tornus and middle of termen, and two or three indistinct blackish dots on costa towards apex: cilia grey, with a few whitish specks. Hind-wings grey; cilia light grey.

British Guiana, Mallali, in March (*Parish*); two specimens.

Agriastis, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{4}{5}$, in ♂ simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint thickened with appressed scales, more or less expanded towards apex above, terminal joint as long as second, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with tufts of scales on surface; 1*b* furcate, 2 from towards angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings 1, elongate-trapezoidal, apex obtuse, termen hardly sinuate, cilia over 1; 3 and 4 connate, 5 nearly parallel, 6 and 7 closely approximated towards base; a fringe of hairs from lower margin of cell towards base.

Type *A. peloptila*. Differs from *Battaristis* by the tufts of scales on fore-wings. *Untomia cenelpis*, Wals., belongs to this genus, and *Gelechia viretella*, Zell.

Agriastis prasina, n. sp.

♀. 15 mm. Head and thorax olive-green, face whitish. Palpi blackish with a few greenish specks, apex of second joint white, terminal joint whitish, towards apex yellowish. Abdomen dark grey. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; olive-green, irregularly sprinkled with whitish; black basal dots on costa and in middle; small black triangular spots on costa at $\frac{1}{5}$, before middle, and before subterminal line; some raised scales in disc about $\frac{1}{5}$, and towards dorsum before middle; a small black spot towards costa before second costal spot; stigmata black, discal approximated, second larger, plical obliquely before first discal; subterminal line obscure, whitish-green, from $\frac{3}{4}$ of costa to tornus, somewhat sinuate inwards on upper half; two blackish dots on costa towards apex and termen beneath apex: cilia grey sprinkled with whitish, basal third light green. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); one specimen.

Agriastis peloptila, n. sp.

♂ ♀. 14–15 mm. Head and thorax pale ochreous partially tinged with brownish. Palpi light ochreous more or less sprinkled with dark fuscous, terminal joint and apex of second ochreous-whitish. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, apex obtuse, termen obliquely rounded; ochreous irregularly sprinkled or mixed with whitish, with some dark fuscous

scales; a dark brown dot near base in middle, and an erect mark on base of dorsum; ochreous-brown or dark fuscous spots on costa at $\frac{1}{5}$, before middle, and before subterminal line, two latter more or less elongate; an oblique dark brown mark on fold beneath first of these, and a spot in disc before it; large subdorsal dark brown tufts beneath each of costal spots; a somewhat elongate dark brown spot just beneath second costal, partially confluent with it; stigmata obscure, rather dark fuscous, discal approximated, plical obliquely before first discal; a whitish subterminal line from $\frac{3}{4}$ of costa to tornus, sinuate inwards on upper half, preceded in disc by an indistinct dark fuscous dash; two or three indistinct dark fuscous marginal dots round apex: cilia fuscous sprinkled with whitish, towards base obscurely barred with ochreous and darker fuscous. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); three specimens.

Agriastis nocturna, n. sp.

♂ ♀. 12 mm. Head and thorax dark fuscous sprinkled with light greyish-ochreous. Palpi dark fuscous irrorated with whitish-ochreous, apical edge of second joint whitish edged beneath with blackish suffusion, terminal joint ochreous-whitish more or less sprinkled with dark fuscous. Abdomen dark fuscous. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; dark fuscous, more or less irrorated with pale greyish-ochreous; markings obscure, formed by absence of pale irroration; a subbasal dot in middle, and erect mark from base of dorsum; an irregular transverse line at $\frac{1}{5}$, angulated inwards beneath costa and outwards in middle; elongate spots on costa before middle and before subterminal line, and an oval spot beneath first of these partially confluent with it; stigmata moderate, discal approximated, plical obliquely before first discal; an obscure pale greyish-ochreous subterminal line from $\frac{3}{4}$ of costa to tornus, sinuate inwards on upper portion and outwards on lower; several dark marginal dots round apical part of costa and termen: cilia dark fuscous irrorated with pale greyish-ochreous points. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); two specimens.

Agriastis scalata, n. sp.

♂ ♀. 12–14 mm. Head and thorax grey, more or less irrorated with whitish. Palpi white, second joint dark fuscous except apical

edge, terminal joint sometimes infuscated at tip. Abdomen dark grey. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; fuscous, strongly and suffusedly irrorated with whitish; black basal dots on costa and in middle; three wedge-shaped blackish spots on costa at $\frac{1}{4}$, middle, and before subterminal line; an oblique dark fuscous mark on fold beneath first of these, and a small round spot towards costa before second; stigmata dark fuscous, plical slightly before first discal, second discal larger; subterminal line obscurely whitish, from $\frac{3}{4}$ of costa to tornus, forming a spot on costa, sinuate inwards on upper half, on dorsum preceded by an undefined spot of dark brown suffusion; two distinct black dots on costa towards apex and termen beneath apex, and sometimes two or three other smaller ones: cilia grey sprinkled with whitish, with obscure darker bars. Hind-wings dark grey, lighter in disc anteriorly; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, in February and March (*Parish*); thirty specimens.

Agriastis inquieta, n. sp.

♂. 15–16 mm. Head and thorax pale greyish-ochreous somewhat sprinkled with fuscous. Palpi whitish-ochreous, second joint with broad bands of dark fuscous suffusion above and below middle, terminal joint sprinkled with dark fuscous. Abdomen dark fuscous. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen obliquely rounded; pale greyish-ochreous, more or less tinged or suffused with brown, and sprinkled with fuscous and dark fuscous scales; a dark fuscous elongate dot towards costa near base; elongate dark fuscous marks on costa about middle and $\frac{2}{3}$; stigmata represented by small tufts of dark fuscous or blackish scales suffused with reddish-brown, an additional tuft adjoining first discal obliquely above and before it, plical beneath first discal, an additional tuft beneath second discal; a spot of dark reddish-fuscous suffusion on dorsum before tornus; a row of blackish dots round posterior part of costa and termen: cilia light greyish-ochreous, towards base barred with grey. Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Bartica, in February (*Parish*); six specimens.

Sorotacta, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{4}{5}$, basal joint elongate, without pecten. Labial palpi very long, re-

curved, second joint thickened with dense scales, considerably expanded towards apex, somewhat projecting angularly above and beneath, terminal joint as long as second, with rough projecting scales posteriorly except towards apex, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with tufts of scales on surface; 1*b* furcate, 2 from towards angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings 1, elongate-trapezoidal, apex obtuse-pointed, termen slightly bisinuate, cilia $1\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated, 6 and 7 closely approximated towards base.

Allied to *Agriastis* and *Alsodryas*. It approaches some forms of *Chelaria* in structure, but may be distinguished by terminal joint of palpi not longer than second.

Sorotacta viridans, n. sp.

♀. 11–12 mm. Head and thorax grey-whitish tinged or irrorated with light greenish. Palpi blackish sprinkled with light greenish, terminal joint and apex of second whitish. Abdomen dark grey. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; light dull green, finely sprinkled with whitish; a small blackish spot on base of costa, and black subbasal dot in middle; small wedge-shaped black spots on costa at $\frac{1}{5}$, before middle, and $\frac{2}{3}$, suffused beneath with deep olive-green and edged posteriorly with whitish; discal stigmata blackish, raised, somewhat whitish-edged, first rather large, second forming apex of an irregular dark grey whitish-edged praetornal blotch; plical stigma represented by a greenish tuft, obliquely before first discal, preceded by a small blackish dot; an indistinct whitish line from beyond third costal spot to tornus, obtusely angulated in middle; two blackish dots on costa towards apex and termen beneath apex, and some grey-whitish suffusion along margin: cilia grey sprinkled with whitish. Hind-wings dark grey; cilia grey.

British Guiana, Mallali, in March (*Parish*); two specimens.

Chelaria mundana, n. sp.

♂♀. 18–23 mm. Head and thorax grey-whitish, sometimes irrorated with grey. Palpi grey-whitish, irregularly irrorated with dark fuscous, second joint much thickened with dense appressed scales, terminal joint thickened with dense projecting scales posteriorly throughout except at apex. Abdomen dark grey, segmental margins whitish. Fore-wings elongate, narrow, costa

slightly arched, apex obtuse, termen rounded, somewhat oblique; 6 separate; grey or dark grey, suffusedly irrorated or sometimes mostly suffused with whitish; a short black dash from base above middle, beyond which is a large triangular tuft; a triangular blackish costal blotch extending from $\frac{1}{3}$ to $\frac{2}{3}$, its apex truncate, reaching half across wing, its margins marked with several small tufts; some pale yellowish suffusion on fold beyond this; a slender black streak running from disc at $\frac{2}{3}$ to termen beneath apex, area round this suffused with dark fuscous posteriorly: cilia grey sprinkled with whitish, basal third suffusedly barred with dark grey. Hind-wings dark fuscous, lighter and thinly scaled anteriorly; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica, from December to February (*Parish*); six specimens.

Chelaria cancellata, n. sp.

♂ ♀. 9–12 mm. Head whitish, sometimes sprinkled with pale fuscous. Palpi whitish, irregularly sprinkled or indistinctly banded with dark fuscous, second joint with short rough apical tuft beneath, terminal joint thickened with slightly rough scales. Thorax whitish, irregularly sprinkled with dark fuscous. Abdomen grey. Fore-wings elongate, narrow, costa gently arched, faintly sinuate in middle, apex obtuse, termen rounded, rather strongly oblique; 6 to apex, closely approximated to 8 at base, 7 absent; whitish, sprinkled with dark fuscous; four semi-oval dark fuscous costal blotches between base and $\frac{3}{4}$, nearly touching on margin, first two with whitish-ochreous tufts adjoining them beneath; a whitish-ochreous tuft on fold beneath second costal blotch; dorsum and disc irregularly blotched with dark grey, with some irregularly grouped blackish scales, viz. three dorsal blotches, one in disc before middle, one beyond this beneath middle, two transversely placed in disc at $\frac{2}{3}$, all these ill-defined and tending to coalesce; apical fourth of wing irregularly suffused with dark grey and sprinkled with blackish: cilia grey sprinkled with whitish points. Hind-wings grey, veins suffused with dark grey, in ♂ paler and hyaline on basal half; cilia light grey.

British Guiana, Bartica, from December to February (*Parish*); ten specimens.

Anthinora, n. g.

Head smooth; ocelli absent; tongue developed. Antennae $\frac{3}{4}$, in ♂ simple, basal joint moderately elongate, without pecten. Labial palpi long, curved, ascending, in ♂ with second joint very

long, basal half slender, apical half thickened and roughened with scales anteriorly, terminal joint very short, pointed, in ♀ with second joint slightly thickened with scales, hardly roughened anteriorly, terminal joint $\frac{2}{3}$ of second, slender, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with 2 from towards angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings $\frac{3}{4}$, elongate-trapezoidal, apex somewhat produced, termen obliquely sinuate, cilia $2\frac{1}{2}$; lower margin of cell very near dorsum, 3 and 4 connate, 5 absent, transverse vein absent, 6 and 7 stalked.

An interesting form of doubtful affinity, possibly related to *Anacampsis*.

Anthinora xanthophanes, n. sp.

♂♀. 9–10 mm. Head, palpi, and thorax orange-yellow. Abdomen ochreous-orange, segmental margins more or less sprinkled with metallic-blackish. Fore-wings elongate, narrow, costa gently arched, apex obtuse-pointed, termen very obliquely rounded; orange-yellow; markings leaden-metallic irrorated with blackish; a median longitudinal streak from base to $\frac{1}{3}$; an oblique streak from middle of dorsum to disc above middle; spots beneath costa before middle and at $\frac{3}{5}$; second discal stigma represented by an oblique transverse mark in disc at $\frac{3}{4}$; a group of scattered scales on tornus; a slender streak from beyond second discal stigma to costa before apex; some scales along termen: cilia yellowish, on termen with a greyish basal shade becoming a grey antemedian band on tornus. Hind-wings in ♂ subhyaline, pale greyish, in ♀ rather dark grey; cilia pale yellowish.

British Guiana, Bartica, in February (*Parish*); two specimens.

Anacampsis lithomorpha, n. sp.

♂♀. 13–15 mm. Head and thorax glossy dark bluish-grey. Palpi grey, second joint suffused with whitish, in ♀ with a blackish apical ring. Abdomen dark fuscous. Fore-wings elongate, narrow, costa hardly arched, towards apex gently, apex obtuse, termen obliquely rounded; glossy dark violet-slaty-grey: cilia concolorous. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous, in ♂ sometimes thinly scaled in disc towards base; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica and Mallali, from December to April (*Parish*); thirty specimens.

Anacampsis cassidata, n. sp.

♂. 16 mm. Head glossy indigo-blue, side-tufts ochreous-yellow. Palpi grey. Thorax leaden-grey. Abdomen dark grey. Fore-wings elongate, narrow, costa somewhat sinuate, apex obtuse, termen obliquely rounded; dark violet-leaden-grey; base slenderly dark fuscous; a dark fuscous transverse streak at $\frac{1}{6}$; a suffused dark fuscous streak from fold at $\frac{2}{3}$ of wing slightly upcurved to costa beyond middle; a suffused dark fuscous streak from disc beyond middle to costa just above apex: cilia leaden-grey. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia light grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); one specimen.

Anacampsis orthophracta, n. sp.

♂. 12 mm. Head and thorax dark violet-grey. Palpi grey. Abdomen dark fuscous. Fore-wings elongate, narrow, costa faintly sinuate, apex obtuse, termen rounded, oblique; dark fuscous; four dark blue-leaden direct transverse fasciae, first narrow, basal, sometimes connected with second on dorsum, second at $\frac{1}{3}$, broad, third postmedian, broad, fourth from $\frac{4}{5}$ of costa to tornus, narrow; a slender blue-leaden streak along termen: cilia dark fuscous. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia dark grey.

British Guiana, Bartica and Mallali, in January and March (*Parish*); two specimens.

Anacampsis ferreata, n. sp.

♂. 14–16 mm. Head and thorax dark leaden-grey. Palpi grey, Abdomen dark fuscous. Fore-wings elongate, narrow, posteriorly somewhat dilated, costa faintly sinuate, apex obtuse, termen slightly rounded, oblique; dark indigo-blue-leaden; a slender rather oblique suffused blackish fascia at $\frac{1}{4}$, sometimes almost obsolete; stigmata obscure, blackish, plical somewhat before first discal; a narrow blackish subterminal fascia nearly parallel to termen; a blackish streak along termen: cilia grey, with dark grey subbasal line. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, with dark fuscous subbasal line.

British Guiana, Bartica, from December to February (*Parish*); four specimens.

Anacampsis refracta, n. sp.

♂ ♀. 12–13 mm. Head and thorax bronzy-grey, partially tinged with brown. Palpi grey-whitish. Abdomen dark fuscous. Fore-wings elongate, narrow, somewhat dilated posteriorly, costa rather sinuate, apex obtuse, termen nearly straight, rather oblique; dark brown; four very obscure violet-fuscous direct transverse fasciae, first moderate, subbasal, second broad, antemedian, third very broad, postmedian, fourth from $\frac{4}{5}$ of costa to tornus, sometimes slightly incurved, narrow, posteriorly suffused; a small obscure spot of ground colour in third representing second discal stigma: cilia pale grey tinged with brown, on tornus brown. Hind-wings over 1, apex obtuse, termen not sinuate; dark fuscous; cilia grey, with dark grey basal line.

British Guiana, Bartica and Mallali, from December to April (*Parish*); eighteen specimens.

Anacampsis trimolybda, n. sp.

♀. 12–13 mm. Head and thorax dark bluish-leaden-grey. Palpi grey. Abdomen dark fuscous. Fore-wings elongate, narrow, somewhat dilated posteriorly, costa rather sinuate, apex obtuse, termen rounded, rather oblique; dark fuscous; three moderately broad transverse leaden fasciae, first almost basal, second before middle, rather oblique, broadest towards dorsum, third about $\frac{2}{3}$, somewhat curved outwards, not quite reaching costa or dorsum; a leaden dot in disc beyond middle; a somewhat curved lighter fuscous subterminal shade from $\frac{4}{5}$ of costa to tornus, extremities whitish: cilia grey, with dark fuscous antemedian shade. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica and Mallali, in December and March (*Parish*); two specimens.

Anacampsis cistulata, n. sp.

♂ ♀. 12–14 mm. Head and thorax dark leaden. Palpi grey. Abdomen dark fuscous. Fore-wings elongate, narrow, posteriorly rather dilated, costa rather sinuate, apex obtuse, termen slightly rounded, oblique; blackish; three blue-leaden fasciae, first moderate, basal, second and third broad, enclosing a triangular median costal blotch and confluent on lower half, extending on dorsum from $\frac{1}{3}$ to near tornus, sometimes partially whitish-sprinkled; a similar hardly curved shade from $\frac{3}{5}$ of costa to tornus, white on costa, almost confluent with third fascia; a blue-leaden sometimes whitish-sprinkled streak along termen: cilia leaden-grey, base

blackish. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, base dark fuscous.

British Guiana, Bartica and Mallali, from December to March (*Parish*); four specimens.

Anacampsis sporozona, n. sp.

♂ ♀. 13–16 mm. Head and thorax dark grey, face white. Palpi grey, second joint more or less suffused with whitish. Abdomen dark fuscous, segmental margins white towards sides. Fore-wings elongate, narrow, posteriorly rather dilated, costa rather sinuate, moderately arched towards apex, apex obtuse, termen rounded, rather oblique; blackish; markings formed of white irroration; a narrow basal fascia, widest on dorsum; a broad oblique antemedian fascia, sometimes connected on dorsum with basal, marked with a more or less distinct blackish spot representing plical stigma; a broad postmedian direct fascia, not reaching dorsum, marked with a round blackish spot representing second discal stigma; a slightly curved subterminal shade; a slender streak along termen: cilia white, tinged with grey towards tornus, basal third grey. Hind-wings over 1, apex obtuse, termen hardly sinuate; cilia pale grey, basal third grey, round apex sometimes whitish-tinged towards tips.

British Guiana, Bartica and Mallali, from December to April (*Parish*); ten specimens.

Anacampsis blepharopa, n. sp.

♂ ♀. 12–14 mm. Head and thorax grey or dark grey, face white. Palpi grey suffused with whitish, second joint with dark grey subapical ring. Abdomen dark fuscous. Fore-wings elongate, narrow, posteriorly somewhat dilated, costa rather sinuate, moderately arched towards apex, apex obtuse, termen rounded, rather oblique; blackish; markings lilac-grey, sometimes slightly whitish-sprinkled, more or less marked with white on costa; a narrow oblique subbasal fascia; moderate antemedian and postmedian fasciae converging towards dorsum and confluent on lower third, second marked with a rather large round blackish spot outlined with white representing second discal stigma; a patch of white irroration or suffusion on apical portion of costa; a separate semicircular patch of whitish irroration on termen more or less indicated, sometimes nearly obsolete: cilia grey, on costa white. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, with dark grey subbasal line.

British Guiana, Bartica, in January and February (*Parish*); five specimens.

Anacampsis praenivea, n. sp.

♀. 12–13 mm. Head dark grey, face lighter. Palpi grey suffused with whitish, second joint with dark fuscous subapical ring. Thorax blackish. Abdomen dark fuscous, apex pale ochreous. Fore-wings elongate, narrow, posteriorly somewhat dilated, costa rather sinuate, gently arched towards apex, apex obtuse, termen rounded, rather oblique; blackish; a little-marked narrow oblique subbasal fascia, indicated by some white scales or greyish suffusion; undefined broad antemedian and postmedian fasciae of white irroration, converging towards dorsum and confluent on lower portion, first more strongly suffused with white anteriorly on costal half, plical and second discal stigmata represented on these by obscure small blackish spots; a well-marked white transverse line at $\frac{5}{6}$ parallel to termen, sinuate inwards towards costa and dorsum, curved outwards on median portion; terminal area beyond this sprinkled with white: cilia white, on tornus greyish, on costa and tornus with basal third mixed with dark fuscous. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, with dark grey subbasal line, tips whitish round apex.

British Guiana, Mallali, in March (*Parish*); three specimens.

Anacampsis scopulata, n. sp.

♂. 12–13 mm. Head and thorax dark bronzy-grey, lower part of face and shoulders suffused with white. Palpi white, second joint faintly greyish-ribbed, terminal joint finely irrorated with black anteriorly. Abdomen dark grey. Fore-wings elongate, narrow, costa almost straight, towards apex gently arched, apex obtuse, termen obliquely rounded; pale greyish-ochreous suffusedly mixed with grey and white, costa suffused with white anteriorly; a large dark grey blotch extending along dorsum from base to $\frac{2}{3}$ and reaching $\frac{2}{3}$ across wing, its edge irregularly projecting and margined with white, rounded off posteriorly; an oblique white strigula from costa at $\frac{2}{3}$, followed by a triangular dark grey patch; beyond this a white costal spot, edged beneath by a black mark, from which a slightly curved narrow silvery-whitish-grey praemarginal fascia runs to tornus, cut by two black dashes towards middle: cilia grey, with two or three dark fuscous lines, at apex with dark fuscous projection, base whitish limited by a dark fuscous line. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous, becoming blackish posteriorly; cilia grey, with dark grey subbasal shade, round apex with whitish patch on outer $\frac{2}{3}$.

British Guiana, Mallali, in March (*Parish*); six specimens.

Anacampsis thysanora, n. sp.

♂. 17–18 mm. Head and thorax dark grey, face suffused with whitish. Palpi black, second joint finely ribbed with white, terminal joint finely irrorated with white tending to form ribs, posteriorly white. Abdomen dark fuscous. Fore-wings elongate, narrow, costa almost straight, towards apex gently arched, apex obtuse, termen rounded, rather oblique; glossy dark leaden-grey, sometimes whitish-sprinkled in disc; black subbasal dots in middle and on dorsum; cloudy blackish dots obliquely placed above and below fold at $\frac{1}{5}$ of wing; stigmata obscurely darker, partially edged with some whitish scales; an obscure obtusely curved-angulated subterminal line of whitish irroration from a white dot on costa at $\frac{4}{5}$ to tornus, preceded by irregular white irroration tending to form longitudinal marks, and followed by a round suffused black spot towards costa, and three large dots towards termen, terminal area purplish-tinged: cilia rather dark purplish-fuscous, with base whitish limited by a dark fuscous line edged posteriorly with whitish suffusion. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; a downwards-directed fringe of long pale ochreous hairscales beneath costa from base to beyond middle, more yellowish posteriorly; cilia grey, with dark fuscous subbasal shade.

Peru, Pacaya, in August (*Mounsey*); two specimens.

Anacampsis leucorrhapta, n. sp.

♀. 14 mm. Head and thorax dark grey, face suffused with whitish. Palpi with second joint black finely ribbed with white, terminal joint blackish finely speckled with white, posteriorly white towards base. Abdomen dark fuscous. Fore-wings elongate, narrow, costa almost straight, gently arched near apex, apex obtuse, termen rounded, rather oblique; dark fuscous, sometimes slightly sprinkled with whitish; a black dot near base in middle; a suffused black spot on fold at $\frac{1}{5}$; stigmata faintly indicated; a fine slightly interrupted white subterminal line from $\frac{3}{4}$ of costa to tornus, angulated in middle; an oval black spot near costa before apex, and a short black dash above it; a clear white dash towards apex, several indistinct short whitish marks between this and tornus more or less indicated, and a black dash before termen in middle: cilia fuscous, base ochreous-whitish limited by a dark fuscous line, on tornus whitish-tinged. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica, in December and February (*Parish*); two specimens.

Anacampsis amaurota, n. sp.

♂ ♀. 16–17 mm. Head and thorax grey, face suffused with whitish. Palpi white, second joint faintly ribbed with grey, terminal joint anteriorly grey speckled with whitish. Abdomen dark grey. Fore-wings elongate, narrow, costa hardly arched, towards apex gently, apex obtuse, termen rounded, rather oblique; dark fuscous, somewhat sprinkled with white on anterior half; black basal dots on costa and dorsum and in middle; a moderate oblique fasciaform blackish spot from $\frac{1}{5}$ of dorsum reaching $\frac{2}{3}$ across wing; stigmata hardly darker, discal approximated, plical rather obliquely before first discal; some blackish-fuscous suffusion towards costa from middle to subterminal line; a fine white slightly curved subterminal line from $\frac{3}{4}$ of costa, becoming irregular and broken in disc and not reaching tornus; an elongate black spot beneath costa before apex, a very short white dash beneath this, and two black dashes towards upper part of termen, edged with a few white scales posteriorly: cilia fuscous, base whitish limited by a dark fuscous line. Hind-wings over 1, apex obtuse, termen not sinuate; dark fuscous; submedian fold in ♂ forming a deep pale fuscous groove, its margins clothed with short hairs; cilia light grey, with dark fuscous subbasal line.

British Guiana, Bartica, in December and January (*Parish*); two specimens.

Anacampsis halmyra, n. sp.

♂ ♀. 12–13 mm. Head and thorax ashy-grey, face lighter or whitish. Palpi with second joint black finely ribbed with white, terminal joint white, anteriorly black finely irrorated with white. Abdomen dark grey. Fore-wings elongate, narrow, costa almost straight, faintly sinuate in middle, towards apex gently arched, apex obtuse, termen obliquely rounded; dark grey, more or less variably sprinkled or mixed with white on anterior half; small black subcostal and subdorsal spots at base; a thick oblique black streak from $\frac{1}{5}$ of dorsum to disc, apex sometimes expanded; two blackish dots towards costa above this; stigmata moderate, blackish, discal approximated, plical rather before first discal; a fine white slightly interrupted subterminal line from $\frac{4}{5}$ of costa to tornus, slightly sinuate inwards towards costa, preceded by a dark fuscous fascia; a black wedge-shaped longitudinal mark resting on costa near apex, and two black dashes towards upper part of termen, between these markings some indistinct suffused whitish dashes: cilia dark grey, base white limited by a dark fuscous line, towards tornus whitish.

Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; submedian fold in ♂ filled with long hairs; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica, from December to February (*Parish*); twenty-two specimens. May always be distinguished from *diortha* by the want of the defined white praeterminal blotch.

Anacampsis diortha, n. sp.

♂ ♀. 12–14 mm. Head and thorax light grey, face sometimes whitish. Palpi with second joint black finely ribbed with white, terminal joint white, anteriorly black irrorated with white. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly arched, towards apex gently, apex obtuse, termen obliquely rounded; grey, sometimes more or less sprinkled with black and white; a black spot beneath costa near base; an oblique blackish streak from $\frac{1}{5}$ of dorsum reaching half across wing; stigmata moderate, cloudy, blackish, discal approximated, plical obliquely before first discal; a fine white nearly straight more or less interrupted subterminal line from $\frac{4}{5}$ of costa to tornus, preceded by a deep brown fascia becoming blackish on costa; between this and termen a transverse whitish sometimes bluish-tinged blotch crossed by two black dashes and surmounted by a small elongate black spot: cilia brown or dark fuscous, with base ochreous-white limited by a dark fuscous line, towards tornus lighter or whitish. Hind-wings over 1, apex obtuse, termen not sinuate; dark fuscous; submedian fold in ♂ filled with long hairs; cilia grey, with dark fuscous subbasal line.

British Guiana, Bartica, from December to February (*Parish*); twenty-four specimens.

Anacampsis anthracura, n. sp.

♂ ♀. 14–17 mm. Head and thorax light brown, lower part of face whitish. Palpi with second joint black finely ribbed with white, terminal joint white, anteriorly black, finely speckled with white. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, towards apex gently, apex obtuse, termen obliquely rounded; ochreous-brown, from near base to $\frac{2}{3}$ irrorated with blackish and sometimes partially tinged with whitish; an elongate suffused black patch along posterior fourth of dorsum to tornus; a fine subterminal line of more or less scattered white scales, moderately curved outwards; a black dash towards costa above apex; two black dashes towards termen in middle, more or

less edged with white suffusion, often forming a transverse white praeterminal blotch: cilia ochreous-brown, base ochreous-whitish, limited by a deeper ochreous-brown line. Hind-wings over 1, apex obtuse, termen hardly sinuate; blackish; submedian fold in ♂ furnished with long hairs towards base; cilia grey, darker towards base, round apex with a pale brownish-ochreous patch on outer $\frac{2}{3}$.

British Guiana, Bartica and Mallali, from December to March (*Parish*); twenty specimens.

Anacampsis incurva, n. sp.

♀. 17–19 mm. Head, thorax, and abdomen dark grey. Palpi with second joint black finely ribbed with white, terminal joint white, anteriorly black finely irrorated with white. Fore-wings elongate, narrow, costa almost straight, faintly sinuate in middle, rather arched towards apex, apex obtuse, termen somewhat rounded, little oblique; brown, anteriorly or more or less wholly suffused with dark grey; a narrow dark brown fascia about $\frac{1}{5}$, angulated above middle; second discal stigma obscurely dark fuscous; undefined patches of dark brown or dark fuscous suffusion on costa and dorsum from middle to subterminal line; a fine white subterminal line from $\frac{4}{5}$ of costa to tornus, curved inwards on upper half and slightly outwards on lower; a small black spot suffused with deep brown near costa before apex, and a short black dash near termen beneath apex: cilia brown mixed with whitish, base white limited by a dark fuscous line. Hind-wings over 1, apex obtuse, termen hardly sinuate; blackish-grey; cilia grey, basal third darker.

British Guiana, Bartica and Mallali, in December and March (*Parish*); three specimens.

Anacampsis inusta, n. sp.

♂. 10 mm. Head and thorax grey, face pale greyish-ochreous, posterior extremity of thorax blackish. Palpi whitish finely irrorated with light grey. Abdomen grey. Fore-wings elongate, narrow, costa nearly straight, faintly sinuate beyond middle, toward apex gently arched, apex obtuse, termen rounded, oblique; dark grey, slightly sprinkled with whitish; costal edge blackish from base to middle, where it is terminated by an oblique spot; a very oblique thick blackish streak from $\frac{1}{6}$ of dorsum to $\frac{2}{3}$ of disc; discal stigmata obscurely indicated; a very fine hardly incurved subterminal line from $\frac{4}{5}$ of costa to tornus, slightly edged anteriorly with dark fuscous, on costa by a patch of dark fuscous suffusion only separated from median spot by a few whitish specks; a costal patch of fine whitish

rroration beyond this; two fine black longitudinal strigulae touching costa towards apex, and two others touching termen towards middle: cilia grey, base whitish limited by a brown line mixed with dark fuscous. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, becoming darker towards base.

British Guiana, Bartica, in February (*Parish*); one specimen.

Anacampsis brochospila, n. sp.

♂♀. 9–11 mm. Head and thorax fuscous, face suffused with whitish-ochreous. Palpi whitish, second joint with faintly indicated greyish ribs, posteriorly fuscous, terminal joint anteriorly dark grey finely speckled with whitish. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly sinuate, towards apex gently arched, apex obtuse, termen rounded, rather oblique; brownish, suffusedly mixed or wholly suffused with dark grey; basal area usually more or less distinctly streaked longitudinally with ochreous-whitish; a blackish subcostal streak from near base to $\frac{1}{4}$, and an oblique sometimes sinuate streak from dorsum towards base reaching half across wing more or less developed; an ochreous-whitish spot on costa at $\frac{1}{4}$; an oblique ochreous-whitish streak from dorsum at $\frac{1}{4}$, sometimes reduced to a spot on fold; a dark fuscous oblique streak from costa before middle to an elongate whitish spot in disc at $\frac{2}{3}$ surrounded with dark fuscous; a similar spot on fold before middle, whence a streak of dark fuscous suffusion runs along fold to its extremity; some dark fuscous suffusion along costa before subterminal line; a slender whitish subterminal line from $\frac{4}{5}$ of costa to tornus, slightly or hardly angulated in middle and somewhat interrupted on angle; several small whitish praemarginal spots round apical part of costa and termen, followed by more or less developed dark fuscous marginal dots: cilia pale brown, variably mixed with fuscous, towards tips whitish. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark fuscous; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from January to March (*Parish*); four specimens.

Anacampsis eupecta, n. sp.

♂♀. 12–13 mm. Head and thorax grey. Palpi grey, second joint suffused with whitish towards apex, terminal joint suffused with whitish posteriorly. Abdomen dark grey. Fore-wings elongate, narrow, costa hardly arched, towards apex gently, apex obtuse, termen obliquely rounded; grey; an indistinct dark fuscous dot in disc at $\frac{1}{4}$; stigmata small, indistinct, dark fuscous, plical

obliquely before first discal; a grey-whitish slightly incurved subterminal line from $\frac{4}{5}$ of costa to tornus, edged anteriorly by a narrow fascia of dark fuscous suffusion; a series of blackish dots round apical portion of costa and termen: cilia whitish-ochreous tinged with grey, towards base faintly barred with grey irroration. Hind-wings over 1, apex obtuse, termen slightly sinuate; dark fuscous; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from December to March (*Parish*); ten specimens.

Anacampsis percnospila, n. sp.

♀. 17 mm. Head dark ashy-grey, face lighter. Palpi dark grey, with a white anterior line edged with black. Thorax pale greyish-ochreous, anterior margin with four confluent blackish spots. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly arched, more strongly near apex, apex obtuse, termen nearly straight, rather oblique; pale brownish, with scattered blackish scales tending to form strigulae; costal edge whitish-ochreous, with black spots at base, middle, and $\frac{3}{4}$, and anterior half dotted with black; stigmata blackish, discal approximated, plical somewhat before first discal; a moderate blackish terminal fascia, its edge convex, irregular, terminating in tornus: cilia dark fuscous on fascia, elsewhere whitish-ochreous. Hind-wings over 1, apex obtuse, termen hardly sinuate; dark grey; cilia grey, with darker subbasal shade.

British Guiana, Bartica, in January (*Parish*); one specimen.

Anacampsis dicax, n. sp.

♀. 15 mm. Head pale brownish, face and centre of crown bronzy-fuscous. Palpi dark fuscous, terminal joint fuscous-whitish, with dark fuscous line on each side. Thorax pale brownish, shoulders and posterior extremity blackish. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, faintly sinuate in middle, apex obtuse, termen rounded, rather oblique; light brownish; black subbasal dots on costa and in middle; a flattened-triangular black blotch on middle of costa, reaching $\frac{1}{3}$ across wing; stigmata hardly indicated; a small cloudy fuscous spot on costa at $\frac{3}{4}$; a row of almost marginal dark fuscous dots round posterior part of costa and termen, and a row of fuscous marginal dots between these: cilia light brownish. Hind-wings over 1, apex obtuse, termen not sinuate; dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); one specimen.

Strobisia regia, n. sp.

♂ ♀. 9–10 mm. Head and thorax dark leaden-grey. Palpi grey. Abdomen dark fuscous. Fore-wings elongate, rather narrow, costa slightly arched, apex obtuse, termen rounded, rather oblique; black; a subdorsal streak of orange suffusion from base to near tornus; three pale blue-metallic streaks, first from base of costa along submedian fold to $\frac{1}{4}$, second from costa at $\frac{1}{4}$ to just beyond apex of first, third from middle of costa nearly to middle of dorsum, somewhat curved outwards; a postmedian transverse orange fascia, lower half enclosing a somewhat oblique pale golden-metallic streak; a golden-metallic spot or mark on costa beyond this; a curved violet-metallic praemarginal streak along termen: cilia dark grey, on termen with strong violet-metallic iridescence. Hind-wings dark fuscous; cilia dark grey.

British Guiana, Bartica, in February (*Parish*); three specimens.

Strobisia sapphiritis, n. sp.

♂ ♀. 12–13 mm. Head metallic-blue. Palpi bronzy-fuscous, terminal joint darker anteriorly. Thorax dark bronzy-fuscous, with metallic-blue lateral stripe. Abdomen dark iridescent-fuscous. Fore-wings elongate, rather narrow, posteriorly dilated, costa almost straight, towards apex moderately arched, apex obtuse-pointed, termen sinuate beneath apex, somewhat oblique; bronzy-blackish, markings metallic-blue; a dot near base in middle, a curved oblique series of three towards base, and one beneath fold at $\frac{1}{4}$; an oblique strigula from costa at $\frac{1}{3}$, and a dot beneath it; an oblique streak from middle of costa reaching half across wing; a triangle irregularly outlined on dorsum beyond middle, reaching nearly half across wing; a curved irregular submarginal streak running from $\frac{4}{5}$ of costa to tornus, thickest opposite apex: cilia whitish-grey, with three dark fuscous lines, on termen suffused with light metallic-blue, on tornus dark fuscous. Hind-wings dark fuscous; cilia grey, with two dark fuscous shades. Under-surface of hind-wings with a slightly curved white transverse fascia at $\frac{2}{3}$.

British Guiana, Bartica, from December to February (*Parish*); twenty specimens.

Strobisia ithycosma, n. sp.

♂. 10 mm. Head dark grey, face suffused with whitish. Palpi whitish, terminal joint suffused with grey except towards base. Thorax dark fuscous, patagia leaden-grey. Abdomen dark

fuscous. Fore-wings elongate, rather narrow, posteriorly dilated, costa almost straight, moderately arched towards apex, apex obtuse, termen nearly straight, somewhat oblique; dark fuscous; four blue-leaden-metallic transverse streaks, first towards base, rather thick, second beyond $\frac{1}{3}$, slender, white on costa, third beyond middle, not reaching costa, interrupted below middle, fourth submarginal, slightly sinuate inwards below middle; a white dot on costa before $\frac{2}{3}$, edged beneath by a leaden-metallic dot, whence a fine straight pale brownish line runs to dorsum at $\frac{3}{4}$; a slender pale brownish streak along termen: cilia dark fuscous, round apex and upper half of termen with basal half white (imperfect). Hind-wings dark fuscous; cilia grey, with dark fuscous subbasal shade.

British Guiana, Mallali, in March (*Parish*); one specimen.

Zalithia, Meyr.

I had merged this in *Strobisia*, but now think it better to maintain it as a separate genus; restricting *Strobisia* to those species in which 7 of fore-wings is always absent.

Zalithia euphracta, n. sp.

♂♀. 11–15 mm. Head and thorax dark green-bronze. Palpi whitish-bronze, terminal joint dark purplish-bronze. Abdomen dark fuscous. Fore-wings elongate, narrow, costa hardly arched, faintly sinuate in middle, moderately arched towards apex, apex obtuse, termen obliquely rounded; 7 sometimes absent; dark fuscous, with green reflections; basal fourth dark green-bronze, blue towards costa posteriorly, edge rather oblique; white wedge-shaped marks from costa at $\frac{1}{3}$ and $\frac{2}{3}$, second sometimes prolonged as a line reaching more than half across wing; an outwardly oblique submedian leaden-grey mark beneath first of these, sometimes connected with a projection of lower angle of basal patch; a somewhat oblique narrow median leaden-metallic blackish-edged fascia, more or less dilated on dorsum, preceded by a variable orange band extending to preceding markings but sometimes more or less wholly obsolete; a transverse blue-leaden-metallic line at $\frac{3}{4}$, white on costa, nearly followed by a rather incurved white transverse line, more or less leaden-metallic in disc, both terminated beneath by a suffused orange dorsal spot; apical area of wing occupied by a coppery-purple blotch anteriorly convex and reaching nearly to preceding line: cilia coppery-purple, on costa dark fuscous. Hind-wings dark fuscous; cilia grey, with dark grey subbasal line.

British Guiana, Bartica, from December to February (*Parish*); thirteen specimens. Four of these have vein 7

of fore-wings absent, the other nine exhibiting the normal structure of the genus. In other respects the species accords well with *Zalithia* and not with *Strobisia*. *Strobisia Walkeri*, Wals., is a nearly allied species, differing in the postmedian markings.

Zalithia callichroma, n. sp.

♂ ♀. 12–13 mm. Head deep glossy indigo-blue, collar yellow. Palpi yellow, anterior edge of terminal joint blackish. Antennae blackish, apical $\frac{2}{5}$ white except tip. Thorax deep metallic green with purple reflections. Abdomen dark fuscous, segmental margins in ♀ suffused with deep orange. Fore-wings elongate, narrow, costa hardly arched, apex obtuse, termen obliquely rounded; black; base narrowly metallic-blue-green, extended as a thick streak along dorsum to middle; slender interrupted yellow transverse streaks between this streak and costa at $\frac{1}{6}$ and before middle, and space between them traversed by a yellow costal line and subcostal and median streaks, alternating with narrow metallic-blue-green finely black-edged streaks, the yellow subcostal streak divided by a fine black line; a slender violet-leaden transverse median fascia, narrowly edged with black ground-colour, considerably expanded posteriorly beneath but not quite reaching dorsum; wing beyond this wholly orange-red, except a yellow wedge-shaped mark on costa beyond median fascia, and a bright purple triangular patch extending over termen with its apex reaching inwards in disc nearly to fascia: cilia dark fuscous with coppery reflections. Hind-wings dark fuscous, in ♂ sometimes tinged with orange towards subdorsal area, in ♀ with anterior $\frac{2}{3}$ of wing more or less wholly orange; cilia dark fuscous.

British Guiana, Bartica, from January to April (*Parish*); eleven specimens.

Zalithia sandaracota, n. sp.

♀. 15 mm. Head deep indigo-blue, collar yellow on sides. Palpi yellow, anteriorly blackish on terminal joint and upper part of second. Antennae purple-blackish, apical half white except towards apex. Thorax metallic-green, with purple reflections. Abdomen dark fuscous, segmental margins orange-ochreous. Fore-wings elongate, narrow, costa nearly straight, slightly arched posteriorly, apex obtuse, termen very obliquely rounded; black; base narrowly metallic-blue-green, extended as a thick streak along dorsum to middle; interrupted yellow transverse streaks between

this and costa at $\frac{1}{6}$ and before middle, connected by costal and three other fine yellow longitudinal lines, with metallic-blue-green streaks between first and second, and between third and fourth; a narrow transverse violet-leaden median fascia, triangularly dilated posteriorly on dorsum, edged with black; wing beyond this wholly deep red, except a yellow wedge-shaped mark on costa beyond median fascia, and an elongate violet-leaden spot in disc at $\frac{2}{3}$: cilia dark violet-grey. Hind-wings dark fuscous; cilia grey, with dark fuscous basal line.

British Guiana, Bartica, in January (*Parish*); one specimen.

Zalithia iriantha, n. sp.

♀. 12–13 mm. Head deep glossy indigo, face ochreous-whitish, collar more or less yellow-whitish on sides. Palpi yellow, terminal joint and upper part of second blackish anteriorly. Antennae black, apical $\frac{2}{5}$ white. Thorax deep glossy indigo-blue, sides of dorsum metallic-green. Abdomen dark fuscous. Fore-wings elongate, narrow, costa hardly arched, faintly sinuate towards middle, apex obtuse, termen rounded, rather strongly oblique; black; from base to middle except on margins the wing is suffused with metallic-blue on costal half, metallic-green on dorsal half, with a small yellow subcostal spot near base, and sometimes another at $\frac{1}{4}$; a yellow elongate blotch extending along costa from middle to $\frac{3}{4}$, enclosing a metallic-blue streak; a small irregular yellow spot in middle of disc; a shining blue-purple trapezoidal blotch on dorsum towards tornus, reaching half across wing, upper posterior angle acute, upper anterior angle connected with costal yellow blotch by a blue mark; wing beyond these markings wholly coppery-red: cilia rather dark lilac-grey, on costa light yellowish. Hind-wings dark fuscous; cilia grey, with dark fuscous subbasal line.

British Guiana, Bartica and Mallali, in February and March (*Parish*); three specimens.

Helcystogramma, Zell.

I propose to maintain this also as a distinct genus. In the forewings 2 and 3 are stalked, 7 and 8 stalked, 7 to apex. The Indian species *brabylitis*, Meyr., and *armata*, Meyr., as well as *hibisci*, Staint., are referable here.

Helcystogramma symbolica, n. sp.

♂♀. 12–14 mm. Head and thorax leaden-fuscous. Palpi light bronzy-grey, tip ochreous-whitish. Abdomen dark fuscous. Fore-

wings elongate, rather narrow, posteriorly dilated, costa gently arched, apex obtuse, termen slightly sinuate beneath apex, hardly oblique; violet-leaden-grey, somewhat sprinkled with ochreous-whitish; a fine irregular dark fuscous streak above middle from base to near $\frac{1}{3}$, terminated with ochreous-whitish; an irregularly rounded subtriangular blackish whitish-edged blotch extending on dorsum from $\frac{1}{3}$ to $\frac{2}{5}$ and reaching half across wing; an ochreous-whitish line from costa at $\frac{1}{3}$ to disc beyond middle, edged posteriorly with dark fuscous suffusion, and terminated by a crescentic group of three blackish dots edged with whitish, median largest; an ochreous-whitish line from $\frac{2}{3}$ of costa to tornus, slightly bent in middle and waved on lower half, edged anteriorly with dark fuscous; area beyond this dark fuscous, including a thick curved submarginal leaden-grey shade, and marked on costa with two or three ochreous-whitish dots, and on termen with an ochreous-whitish praemarginal line: cilia violet-leaden, with a coppery-fuscous postmedian shade. Hind-wings dark fuscous; cilia violet-grey.

British Guiana, Bartica, from December to February (*Parish*); thirty specimens. Very like *obseratella*, Zell. (which I identify with *hibisci*, Staint.), but easily distinguished by the absence of the three whitish dashes towards termen characteristic of *hibisci*, and specially mentioned by Zeller.

Helcystogramma adaequata, n. sp.

♀. 14 mm. Head and thorax dark leaden-fuscous. Palpi light fuscous, terminal joint whitish speckled with dark fuscous. Abdomen dark fuscous. Fore-wings elongate, rather narrow, posteriorly rather dilated, costa gently arched, somewhat sinuate beyond middle, apex obtuse, termen slightly sinuate in middle, hardly oblique; dark fuscous; a leaden-grey median streak from base to dorsal blotch; a large semi-oval blotch of ground-colour partially suffused with ferruginous and finely edged with whitish, extending on dorsum from $\frac{1}{4}$ to $\frac{3}{5}$, its upper edge rather prominent in middle and reaching $\frac{2}{3}$ across wing; a thick blue-leaden-grey streak along costa from base to $\frac{1}{3}$, thence continued along posterior edge of dorsal blotch to dorsum, where it coalesces with a narrower slightly curved transverse streak from costa beyond middle, space between these in disc occupied by two transversely placed oval spots of blackish-fuscous suffusion edged with whitish; an oblique ochreous-whitish strigula from costa at $\frac{1}{3}$, and a small spot on costa at $\frac{2}{3}$, whence a faint irregular line runs to dorsum before tornus; a blue-leaden-metallic line from costa before apex to tornus, indented outwards

and interrupted beneath apex; a black terminal line, edged with ochreous-whitish: cilia lilac-grey (imperfect). Hind-wings dark fuscous; cilia grey, darker towards base.

British Guiana, Mallali, in March (*Parish*); one specimen.

Thrypsigenes, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{1}{3}$, in ♂ rather stout, simple, basal joint moderate, without pecten. Labial palpi moderately long, curved, ascending, second joint thickened with scales angularly projecting at apex beneath, terminal joint $\frac{2}{3}$ of second, moderate, acute. Maxillary palpi rudimentary. Posterior tibiae clothed with long hairs above. Fore-wings with 1*b* furcate, 2 from towards angle, 3 from angle, 7 absent, 8 and 9 short-stalked or connate, 11 from beyond middle. Hind-wings under 1, elongate-trapezoidal, apex tolerably pointed, termen slightly sinuate, cilia $1\frac{1}{2}$; 3 and 4 connate, 5 absent, 6 and 7 long-stalked.

Type *colluta*, Meyr. Allied to *Deoclona*.

Thrypsigenes colluta, n. sp.

♂ ♀. 10–13 mm. Head and thorax whitish-ochreous. Palpi ochreous-whitish, slightly sprinkled with fuscous specks. Abdomen whitish-ochreous. Fore-wings elongate, rather narrow, costa gently arched, apex tolerably pointed, termen very obliquely rounded; whitish-ochreous, faintly speckled with greyish: cilia whitish-ochreous, with some faint grey specks towards base. Hind-wings ochreous-whitish or grey-whitish; cilia whitish.

British Guiana, Bartica and Mallali, in February and March (*Parish*); four specimens.

Thrypsigenes furvescens, n. sp.

♂ ♀. 13 mm. Head and thorax light greyish-ochreous. Palpi whitish, second joint grey except apex, terminal joint irrorated with grey. Abdomen grey. Fore-wings elongate, rather narrow, costa gently arched, apex tolerably pointed, termen very obliquely rounded; fuscous; a whitish-ochreous stripe occupying costal third from base to $\frac{1}{2}$: cilia whitish-ochreous. Hind-wings rather dark fuscous; cilia grey.

British Guiana, Bartica, from February to April (*Parish*); two specimens.

Pachnistis rubentula, n. sp.

♂ ♀. 9–10 mm. Head, palpi, and thorax whitish-ochreous, in ♂ rosy-tinged. Abdomen light dull rosy, segmental margins ochreous-whitish. Fore-wings elongate, rather narrow, somewhat dilated posteriorly, costa slightly arched, apex obtuse, termen rounded, rather oblique; pale ochreous; stigmata dark fuscous, plical obliquely before first discal; some small indistinct dark fuscous dots round posterior part of costa and termen, and a larger one at tornus: cilia light dull rosy. Hind-wings and cilia light dull rosy.

British Guiana, Bartica, in December (*Parish*); two specimens.

Pachnistis rhodocrossa, n. sp.

♀. 8 mm. Head and thorax pale greyish-ochreous. Palpi ochreous-whitish sprinkled with dark fuscous except at apex of second joint. Abdomen grey. Fore-wings elongate, somewhat dilated posteriorly, costa gently arched, apex obtuse, termen very obliquely rounded; light greyish-ochreous; second discal stigma dark fuscous; a series of small indistinct dark fuscous dots round posterior part of costa and termen, and a larger one at tornus: cilia light dull rosy. Hind-wings rather dark grey; cilia grey.

British Guiana, Mallali, in March (*Parish*); one specimen.

Glyphidocera exsiccata, n. sp.

♂ ♀. 9–12 mm. Head, palpi, and thorax light brownish-ochreous sprinkled with dark fuscous. Antennal notch of ♂ shallow, simple. Abdomen grey, in ♂ with segments 2 and 3 clothed with modified whitish-ochreous hairscales, anal tuft whitish-ochreous. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, rather oblique; light brownish-ochreous, sprinkled with dark fuscous; a dark fuscous dot in disc at $\frac{1}{4}$; stigmata cloudy, dark fuscous, plical obliquely before first discal, an additional dot beneath second discal; some cloudy dark fuscous dots on termen: cilia grey-whitish, with two dark grey shades. Hind-wings grey or whitish-grey; cilia ochreous-grey-whitish, with faint greyish subbasal shade.

British Guiana, Bartica, from December to February (*Parish*); sixteen specimens.

Glyphidocera inurbana, n. sp.

♂ ♀. 12–16 mm. Head and thorax fuscous. Antennal notch of ♂ deep, covered by curved projection from beneath. Palpi rather dark fuscous, sprinkled with pale ochreous. Abdomen grey, in ♂

with segments 2 and 3 clothed with modified pale greyish-ochreous hairscales, anal tuft pale greyish-ochreous. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen rather obliquely rounded; greyish-ochreous, irrorated with dark fuscous; a cloudy dark fuscous dot in disc at $\frac{1}{4}$; stigmata cloudy, dark fuscous, plical rather obliquely before first discal, second discal transverse: cilia fuscous. Hind-wings and cilia grey.

British Guiana, Bartica and Mallali, from December to March (*Parish*); twenty-five specimens.

Teuchophanes, n. g.

Head with appressed scales; ocelli present; tongue developed. Antennae $\frac{4}{5}$, in ♂ serrulate, shortly ciliated, basal joint elongate, without pecten. Labial palpi very long, recurved, second joint thickened with appressed scales, compressed, terminal joint as long as second, with projecting scales posteriorly except near apex, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae rough-scaled above. Fore-wings with 1*b* furcate, 2 and 3 stalked from angle, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings over 1, trapezoidal, apex obtuse, termen hardly sinuate, cilia $\frac{1}{2}$; 3 and 4 connate, 5 somewhat approximated, 6 and 7 closely approximated towards base.

Teuchophanes leucopleura, n. sp.

♂ ♀. 14–15 mm. Head and thorax bronzy-fuscous, face paler, thorax with two fine white stripes from shoulders approximated posteriorly. Palpi dark bronzy-grey, anterior edge yellow on second joint, whitish on terminal. Abdomen dark fuscous. Fore-wings elongate, rather narrow, costa slightly arched, apex obtuse, termen slightly rounded, little oblique; dark fuscous; broad orange transverse finely black-edged bands before middle and about $\frac{2}{3}$, not reaching dorsum, their lower angles produced into short strigulae, first band rather oblique, its anterior edge white or whitish, second with both sides more or less variably convex or prominent in disc; space between these occupied by a violet-leaden fascia, reaching dorsum, dilated towards costa; second band followed by a narrow violet-leaden fascia from $\frac{4}{5}$ of costa to tornus; beyond this an orange costal spot, whence a very fine orange or grey praemarginal line runs round apex and termen: cilia violet-grey, basal third dark fuscous. Hind-wings dark fuscous; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica and Mallali, from December to March (*Parish*); three specimens.

Ilingiotis, n. g.

Head smooth; ocelli present; tongue developed. Antennae almost 1, in ♂ serrulate, minutely ciliated, basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint with scales triangularly expanded towards apex above and short rough apical tuft beneath, terminal joint as long as second or longer, slender, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with hairs above. Fore-wings with 1*b* furcate, 2 and 3 stalked, 7 absent, 8 and 9 sometimes stalked, 11 from middle. Hind-wings 1, trapezoidal, apex obtuse, termen slightly sinuate, cilia 1; 3 and 4 connate, 5 approximated towards base, 6 and 7 connate, lower margin of cell without pecten.

Type *sevectella*, Walk. A development of *Trichotaphe*.

Ilingiotis thrasynta, n. sp.

♂ ♀. 8–9 mm. Head, thorax, and abdomen grey. Palpi dark grey, second joint with apex white, terminal joint white except anterior edge. Fore-wings elongate, rather narrow, costa gently arched, faintly sinuate towards middle, apex obtuse, termen rounded, oblique; 8 and 9 stalked; grey, mixed with whitish and dark fuscous; a blackish dot in disc at $\frac{1}{3}$; stigmata large, black, pale-edged, plical rather obliquely before first discal, second discal often connected with dorsum by a transverse mark of dark fuscous suffusion; a more or less curved whitish line from $\frac{2}{3}$ or $\frac{3}{4}$ of costa to tornus: cilia grey, with dark grey antemedian line, beneath tornus grey-whitish. Hind-wings grey, in ♂ with margins of lower median vein hyaline towards base; cilia grey.

British Guiana, Bartica and Mallali, in February and March (*Parish*); eight specimens.

Ilingiotis vigilans, n. sp.

♂ ♀. 9–11 mm. Head and thorax light ochreous-bronzy. Palp dark fuscous, second joint with apex white, terminal joint white except anterior edge. Abdomen dark grey. Fore-wings elongate, rather narrow, slightly dilated posteriorly, costa gently arched, apex obtuse, termen rounded, rather oblique; 9 separate; light ochreous-bronzy; a black dot on base of costa; an irregular black dot in disc at $\frac{1}{4}$; stigmata black, discal large, pale-edged, plical small, beneath first discal; a whitish-ochreous spot on costa at $\frac{3}{4}$, whence a slightly curved indistinct whitish-ochreous line runs to

tornus; a row of black dots round posterior part of costa and termen: cilia light brownish-ochreous. Hind-wings dark grey; cilia grey, darker towards base.

British Guiana, Bartica, in February (*Parish*); two specimens.

Ilingiotis sevectella, Walk.

Gelechia sevectella, Walk. Cat. XXX, 1020).

♂ ♀. 10–14 mm. Head light grey, sidetufts ochreous-whitish. Palpi dark fuscous, apical edge of second joint white, terminal joint whitish except anterior edge. Thorax light grey, shoulders suffused with ochreous-whitish. Abdomen grey. Fore-wings elongate, rather narrow, somewhat dilated posteriorly, costa gently arched, more strongly posteriorly, with cilia rather prominent at $\frac{2}{3}$, apex obtuse, termen obliquely rounded; 9 separate; light grey, strigulated with darker and somewhat mixed with ochreous-whitish; costa broadly suffused with ochreous-whitish from base to $\frac{3}{4}$, costal edge blackish towards base; a small black spot towards costa near base; stigmata represented by round blackish spots edged with whitish, plical smaller, slightly beyond first discal; a black dot or mark on costa at $\frac{2}{3}$; a curved whitish line from costa beyond this to tornus; an ochreous-whitish line round posterior part of costa and termen, marked with a series of blackish dots: cilia whitish-ochreous, obscurely barred with fuscous. Hind-wings rather dark grey; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from December to March (*Parish*); twenty-four specimens. Walker's type is from Ega, Brazil.

Pachysaris, n. g.

Head with appressed scales, sidetufts roughly spreading; ocelli present; tongue developed. Antennae nearly 1, in ♂ moderately ciliated, basal joint moderate, without pecten. Labial palpi very long, curved, ascending, second joint much thickened with dense scales, above with very long dense projecting hairs on apical half, expansible interiorly, terminal joint much shorter than second, with rough projecting scales posteriorly except towards apex, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae with rough projecting hairs above and beneath. Fore-wings with 1*b* furcate, 2 and 3 stalked, 7 and 8 stalked, 7 to costa, 11 from middle. Hind-wings over 1, trapezoidal, apex obtuse, termen faintly sinuate, cilia $\frac{1}{2}$; lower margin of cell with pecten of long hairs

towards base; 3 and 4 connate, 5 approximated at base, 6 and 7 connate.

Type *rurigena*, Meyr. Allied to *Trichotaphe*.

Pachysaris collina, n. sp.

♂. 18 mm. Head and thorax fuscous. Palpi fuscous, irrorated with darker. Abdomen dark fuscous. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen rounded, somewhat oblique; fuscous; a small spot of dark fuscous suffusion on base of costa; stigmata very small, obscure, dark fuscous, plical rather obliquely beyond first discal: cilia fuscous, base spotted with paler. Hind-wings dark fuscous, subhyaline towards costa; cilia fuscous.

Peru, Chanchamayo, in January (*Mounsey*); one specimen. The fore-wings are obviously narrower than in *rurigena*.

Pachysaris rurigena, n. sp.

♂ ♀. 17–19 mm. Head grey, sides bronzy-tinged. Palpi dark fuscous, terminal joint more or less white towards apex. Thorax brownish, shoulders blackish. Abdomen grey. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, somewhat oblique; brown; a small blackish spot at base of costa; discal stigmata minute, dark fuscous; a faint hardly paler slightly bent shade from $\frac{1}{6}$ of costa to tornus; a terminal series of minute dark fuscous dots: cilia grey or brownish, base obscurely spotted with paler. Hind-wings rather dark grey; cilia grey, with darker subbasal shade.

British Guiana, Bartica and Mallali, in February and March (*Parish*); four specimens.

Noeza pyretodes, n. sp.

♂. 14–16 mm. Head and thorax ochreous-whitish, patagia mixed with ferruginous. Palpi whitish, second joint with two ferruginous-brownish bands, terminal joint with anterior edge dark fuscous. Abdomen greyish, anal tuft ochreous-whitish. Fore-wings elongate, rather narrow, costa gently arched, flattened and faintly sinuate towards middle, apex obtuse, termen rounded, rather oblique; ochreous-whitish, dorsal $\frac{3}{5}$ suffusedly tinged with pale ferruginous; markings suffused, dark ferruginous; a small mark on base of costa; an irregular patch extending in disc from base to $\frac{1}{4}$; a slender streak along costa from $\frac{2}{5}$ to $\frac{3}{4}$; elongate marks towards costa about middle and $\frac{3}{4}$; a streak through disc from about $\frac{1}{3}$ to $\frac{3}{4}$,

interrupted by a whitish dot representing first discal stigma and two representing second; a short oblique streak terminating in costa above apex; a line along apical portion of costa: cilia whitish-ferruginous. Hind-wings grey; cilia whitish-grey, with darker subbasal shade, round apex ferruginous-tinged.

British Guiana, Bartica, in January and February (*Parish*); two specimens. The hind-wings in this genus have a well-developed pecten of hairs on lower margin of cell towards base.

Nocza zachroa, n. sp.

♂ ♀. 13–14 mm. Head pale ochreous, crown pale shining bronzy. Palpi pale yellowish, second joint with a violet lateral stripe, with long rough hairs above throughout, mixed with blackish, terminal joint white. Thorax leaden-grey suffused with indigo-blue anteriorly. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched, slightly sinuate towards middle, apex obtuse, termen rounded-prominent; yellow-ochreous, tinged with ferruginous towards costa; extreme base purple; a deep blue streak along costa from base to middle, and two other streaks beneath it from base to a transverse deep blue spot at ⅔, upper interval deep red, lower orange; a transverse dark indigo-blue blotch in disc beyond middle, confluent with costal streak, and two small confluent spots between this and preceding blotch; a series of confluent blackish blotches along fold throughout, confluent with these markings above and with a dark grey streak along dorsum from base to tornus; a blue-blackish curved transverse shade at ⅔, preceding a discal blotch of ground-colour suffused with ferruginous above and marked with blue-blackish on veins; beyond this a ferruginous fascia, marked with blue-blackish streaks on veins; terminal yellowish space somewhat brassy-metallic, with three transversely placed blue-black dots: cilia ochreous-yellow, on costa with a blue-black basal line. Hind-wings dark fuscous; cilia grey, round apex ochreous-yellowish with a grey antemedian line.

British Guiana, Bartica, in February (*Parish*); two specimens.

Trichotaphe porphyrogramma, n. sp.

♂ ♀. 11–16 mm. Head pale ochreous, usually more or less tinged or suffused with pale blue-leaden-grey. Palpi white, second joint more or less suffused with violet except apex, with hairs largely expanded above, more or less suffused with ochreous-yellowish except towards tips, terminal joint with violet subbasal band.

Thorax pale ochreous, variably marked or wholly suffused with violet-grey. Abdomen dark grey. Fore-wings elongate, rather narrow, costa gently arched anteriorly and near apex, nearly straight between these, apex obtuse, termen rounded, rather oblique; pale ochreous, more or less variably suffused with bright deep ferruginous or ferruginous-brown, especially on dorsal half or sometimes wholly; all veins and costa marked with well-defined purple-blue or violet-grey streaks; variable inwardly oblique deep ferruginous or ferruginous-brown sometimes blackish-mixed blotches in disc before and beyond middle representing stigmata: cilia whitish, usually with grey or ferruginous median shade, on costa usually suffused with grey except tips. Hind-wings dark grey, lighter anteriorly; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from December to March (*Parish*); ten specimens. Very variable. Also a specimen probably of same species from Yquitos, Peru, in May (*Mounsey*).

Trichotaphe violaria, n. sp.

♀. 14–16 mm. Head pale shining ochreous. Palpi whitish, second joint more or less violet-tinged except apex, with hairs largely expanded above, more or less suffused with ochreous-yellowish except tips, terminal joint with violet subbasal band. Thorax pale ochreous more or less suffused with ferruginous-brown, shoulders dark violet-grey. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly arched, faintly sinuate towards middle, apex obtuse, termen rounded, rather oblique; pale ochreous or whitish-ochreous; costal and subcostal deep violet-blue lines from base to $\frac{2}{3}$, meeting posteriorly, space between these ferruginous-tinged; a violet spot in disc at $\frac{1}{4}$, two smaller ones transversely placed in middle, and a streak along fold; dorsal half from base to beyond middle more or less mixed or suffused with deep ferruginous; a broad deep ferruginous transverse fascia about $\frac{2}{3}$, streaked with dark fuscous on veins, this fascia extended on dorsal half to termen and there suffused upwards to apex: cilia ochreous-whitish, basal third ferruginous, on costa suffused with grey. Hind-wings dark grey; cilia grey, with darker subbasal shade.

British Guiana, Bartica and Mallali, in February and March (*Parish*); eight specimens.

Trichotaphe turrita, n. sp.

♂ ♀. 15–17 mm. Head and thorax light greyish-ochreous. Palpi dark fuscous, second joint with scales expanded towards apex above,

apical edge white, terminal joint whitish except anterior edge. Abdomen grey. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, little oblique; pale fuscous; a large blackish transverse blotch, edged with whitish, occupying median third of dorsum, upper edge projecting furthest posteriorly, where it reaches $\frac{4}{5}$ across wing; second discal stigma round, blackish, whitish-edged; an indistinct rather irregular ochreous-whitish line from $\frac{3}{4}$ of costa to dorsum before tornus, edged with fuscous posteriorly; a series of dark fuscous dots round posterior third of costa and termen: cilia light greyish-ochreous, basal third obscurely barred with fuscous. Hind-wings rather dark grey; cilia grey.

British Guiana, Bartica, in January (*Parish*); two specimens.

Trichotaphe caustonota, n. sp.

♂. 13 mm. Head, thorax, and abdomen dark grey. Palpi dark fuscous, hairs of second joint expanded above on apical half, terminal joint shorter, with apical half white except anterior edge. Fore-wings elongate, narrow, costa gently arched anteriorly, faintly sinuate beyond middle, apex obtuse, termen rounded, rather oblique; yellow-ochreous; costal edge blackish towards base; a moderate dark fuscous streak along dorsum from base to tornus, somewhat dilated before middle; a triangular dark fuscous patch extending on costa from $\frac{2}{5}$ to $\frac{4}{5}$, and reaching half across wing, edged with silvery-whitish; a roundish blotch of dark fuscous suffusion before termen beneath apex; some black terminal dots: cilia dark fuscous, on costa ochreous-yellowish. Hind-wings dark fuscous; cilia grey, with dark fuscous subbasal shade.

British Guiana, Bartica, in January (*Parish*); one specimen.

Trichotaphe carycina, n. sp.

♂ ♀. 19–23 mm. Head and thorax dark purplish-fuscous. Palpi dark fuscous, second joint with scales broadly expanded above towards apex and sprinkled with whitish, terminal joint whitish-ochreous, anterior edge dark fuscous. Abdomen dark fuscous. Fore-wings elongate, rather narrow, posteriorly somewhat dilated, costa slightly arched, faintly sinuate towards middle, apex obtuse, termen faintly sinuate, little oblique; light ochreous-brown, strigulated or sometimes much suffused with deep ferruginous; base deep ferruginous mixed with dark fuscous; costa deep ferruginous from base to near apex; stigmata suffused, ferruginous, plical obliquely before first discal, these two often confluent into a suffused

ferruginous streak extended to dorsum, first discal usually marked with an irregular, blackish-grey spot; a series of blackish dots round apex and termen: cilia reddish-ochreous. Hind-wings dark grey; cilia grey, darker towards base.

British Guiana, Bartica and Mallali, from December to March (*Parish*); five specimens.

Dichomeris opsonoma, n. sp.

♂. 14 mm. Head grey. Palpi dark grey, second joint with scales roughly triangularly expanded towards apex above and with short tuft beneath, apical edge whitish, terminal joint whitish with anterior edge and subapical band blackish. Thorax pale ochreous, with dark grey dorsal stripe. Abdomen whitish-ochreous. Fore-wings elongate, rather narrow, costa gently arched, apex obtuse, termen slightly rounded, nearly vertical; pale ochreous-yellow, whitish-tinged towards costa anteriorly; a narrow brownish streak along dorsum from base to tornus, becoming dark brown towards base; stigmata minute, rather dark fuscous, plical beneath first discal; posterior part of costa and termen somewhat suffused with yellow-ochreous; a marginal series of minute black specks round apex and termen: cilia deep ochreous. Hind-wings ochreous-whitish; cilia whitish-ochreous.

British Guiana, Bartica, in February (*Parish*); one specimen.

Dichomeris zonostoma, n. sp.

♂. 16 mm. Head whitish-ochreous, sides of crown brownish-ochreous. Palpi whitish, second joint with scales triangularly expanded towards apex above and short triangular apical tuft beneath, with two brown bands, anterior edge of terminal joint dark fuscous. Thorax whitish-ochreous, patagia brown. Abdomen grey. Fore-wings elongate, rather narrow, costa gently arched, somewhat sinuate towards middle, apex pointed, termen rounded, rather oblique; whitish-ochreous; a broad irregular brown median stripe from base to apex, and a narrower one along dorsum from near base to middle of termen; veins partially marked with suffused dark fuscous lines on these streaks, and towards costa exteriorly; a narrow suffused fuscous streak along costa from before middle to $\frac{4}{5}$; plical and second discal stigmata blackish; a whitish line round posterior part of costa and termen, marked with a series of black marks or dots on apex and termen: cilia light brownish, darker

towards base, tips whitish, at apex with a dark fuscous bar, on costa whitish. Hind-wings dark grey; cilia grey, darker towards base, round apex suffused with brownish.

British Guiana, Bartica, in December (*Parish*); one specimen.

Dichomeris aequata, n. sp.

♂ ♀. 13–16 mm. Head and thorax whitish-fuscous. Palpi dark fuscous, second joint with scales strongly triangularly dilated above and small triangular apical tuft beneath, apical edge white, terminal joint white, anterior edge blackish. Abdomen grey. Fore-wings elongate, rather narrow, costa gently arched, faintly sinuate towards middle, apex obtuse, termen rounded, rather oblique; light greyish-ochreous, irrorated with fuscous except towards costa anteriorly; a small blackish dot on base of costa; stigmata moderate, blackish, obscurely whitish-edged, plical beneath first discal; a faint pale greyish-ochreous slightly curved shade from $\frac{3}{4}$ of costa to dorsum before tornus; a row of blackish dots round apex and termen: cilia pale greyish-ochreous. Hind-wings rather dark grey; cilia grey.

British Guiana, Bartica, in February (*Parish*); four specimens.

Dichomeris squalens, n. sp.

♂ ♀. 12–13 mm. Head and thorax greyish-ochreous. Palpi dark grey, second joint with scales triangularly expanded towards apex above and short rough triangular apical tuft beneath, apical edge white, terminal joint whitish, anterior edge dark fuscous. Abdomen grey. Fore-wings elongate, rather narrow, costa gently arched, faintly sinuate towards middle, cilia slightly prominent at origin, apex obtuse, termen rounded, rather oblique; greyish-ochreous or pale fuscous, sprinkled with darker fuscous; markings rather dark brown; a small spot on fold at $\frac{1}{4}$; stigmata moderate, plical rather obliquely before first discal, an additional dot more or less marked before and above first discal; an irregular indistinct paler line from $\frac{3}{4}$ of costa to dorsum before tornus, somewhat curved outwards and indented above middle, edged with brown suffusion posteriorly; a series of blackish dots round posterior part of costa and termen: cilia light brownish-ochreous or fuscous. Hind-wings and cilia grey.

British Guiana, Bartica, in January and February (*Parish*); seven specimens.

Dichomeris macroptera, n. sp.

♂ ♀. 15–17 mm. Head pale ochreous, crown sometimes centrally greyish-tinged. Palpi pale ochreous tinged with greyish, second joint with scales triangularly expanded above and long triangular projecting tuft beneath, apical edge whitish, terminal joint whitish, anterior edge blackish. Thorax ochreous-brown. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly arched, apex obtuse, termen obliquely rounded; ochreous-brown, with lilac reflections, somewhat lighter towards disc; dorsal half deep ferruginous, division rather irregular, somewhat whitish-edged in disc; dorsal edge suffused with dark grey towards base; stigmata elongate, blackish, plical slightly beyond first discal, sometimes confluent with it; blackish streaks on veins 4 and 5 towards termen: cilia light ochreous, somewhat ferruginous-tinged. Hind-wings rather dark grey, lighter in disc anteriorly; cilia grey, round apex suffused with pale ochreous.

British Guiana, Bartica, from December to February (*Parish*); two specimens.

Dichomeris zomias, n. sp.

♂ ♀. 13–15 mm. Head and thorax ferruginous-brownish, crown tinged with grey. Palpi ferruginous-brownish irrorated with deep ferruginous, second joint with long rough projecting scales above and moderate somewhat projecting apical tuft beneath, terminal joint whitish, anterior edge dark fuscous. Abdomen dark grey. Fore-wings elongate, narrow, costa slightly arched, faintly sinuate towards middle, apex obtuse, termen rounded, rather oblique; ferruginous-brown, with some scattered dark fuscous scales; stigmata obscure, cloudy, fuscous or darker, sometimes forming elongate spots, dorsal half of wing sometimes much obscured with dark fuscous irroration partially concealing these; an almost marginal streak of dark fuscous suffusion just before termen, strongest upwards: cilia ferruginous-brown. Hind-wings and cilia dark grey.

British Guiana, Bartica and Mallali, from December to March (*Parish*); twelve specimens.

Dichomeris cachrydias, n. sp.

♂ ♀. 11–12 mm. Head pale ochreous, with light grey central stripe. Palpi dark fuscous, second joint with scales triangularly expanded above and moderate triangular projecting tuft beneath, apical edge whitish, terminal joint whitish except anterior edge,

Thorax pale ochreous, shoulders fuscous. Abdomen dark grey. Fore-wings elongate, narrow, costa gently arched towards extremities, apex tolerably pointed, termen somewhat rounded, rather strongly oblique; ferruginous-ochreous; costa more or less slenderly, dorsum rather broadly infuscated; discal stigmata cloudy, dark fuscous, each more or less surrounded with fuscous suffusion coalescing with a broad streak of fuscous suffusion extending above fold to tornus; an undefined patch of fuscous suffusion towards costa about $\frac{3}{4}$, and a streak along termen: cilia ochreous. Hind-wings and cilia grey.

British Guiana, Mallali, in March (*Parish*); four specimens.

Dichomeris famulata, n. sp.

♂. 13–14 mm. Head and thorax whitish-ochreous. Palpi fuscous, second joint with scales triangularly expanded above and short triangular apical tuft beneath, apical edge whitish, terminal joint whitish, anterior edge dark fuscous. Abdomen grey. Fore-wings elongate, narrow, costa slightly arched, apex tolerably pointed, termen rounded, rather strongly oblique; whitish-ochreous, with scattered dark fuscous scales; costa narrowly suffused with fuscous from base to $\frac{4}{5}$, with more or less indicated darker dots and strigulae; dark fuscous dots beneath fold at $\frac{1}{4}$, and above fold beyond this; a blackish dot towards costa before middle; stigmata blackish, first discal small, plical somewhat obliquely beyond it; a series of blackish dots round posterior part of costa and termen: cilia whitish-ochreous. Hind-wings grey, thinly scaled and subhyaline anteriorly; lower margin of cell with fringe of long hairs towards base; cilia pale grey, with darker subbasal shade round apex.

British Guiana, Bartica, in December (*Parish*); two specimens.

IX. *A Contribution to the Life History of* Agriades thersites, *Cantener*. By T. A. Chapman, M.D., F.Z.S.

[Read March 18th, 1914.]

Plates XXVI–LIII.

In presenting my account of this species to the Society two years ago, I promised myself, all being well, shortly to learn something about its early stages.

In 1912, however, searching for the larvae on Sainfoin, I was only rewarded by finding those of *A. damon* and *P. argyrognomon* (Ent. Mo. Mag., 1914, p. 22), and as regards the imago, though I found specimens, I did not hit off the correct place and season for success.

In 1913 I was more fortunate. I was unlucky in not meeting with the spring brood, but in July and August I obtained specimens and ova. On the 20th July I met with one specimen only, a very fresh male at Bourg d'Oisans, and so, concluding that it was only commencing to come out, I went for a fortnight or so to Le Lautaret, at some 6900 ft. of elevation, and was a good deal surprised to find *thersites* there. On the 24th July, at some 400 ft. below the Hospice, at an actual elevation of about 6500 ft., I found *thersites* on the wing amongst wild Sainfoin in full bloom, some going over, flying with *icarus*, *damon*, *escheri*, *argyrognomon*, *eros*, *minima*, *coridon*, and other butterflies. The *minima* were nearly over, as judged by numbers and condition; the *thersites* nearly all worn and damaged, with a few ♀♀ amongst them. By the 29th *thersites* at this locality were clearly nearly over. At this date I made a note of species flying with it, to illustrate that its companions were really rather of a subalpine type, and not, as I had supposed to be the rule with *thersites*, of a less Northern type than is found in the south of England. It must not be forgotten that Le Lautaret is in many respects a very exceptional locality, close to very alpine areas, for the most part subalpine in its plants and insects, but possessing many species that one hardly expects to find at such an elevation. The species noted as more or less common and flying with *A. thersites* were *Erebia stygne*, *tyndarus*,

P. eros, *icarus*, *A. damon*, *C. minimus*, *P. argyrognomon*, *A. astrarche*, *C. phicomone*, *C. arcanius*, v. *darwiniana*; rather less common or scarce, *A. niobe*, v. *eris*, *B. pales*, *M. cinxia* (very worn), *P. hylas*, *A. coridon*, *C. sebrus*, *A. escheri*, *C. semiargus*. Not many yards off and at the same level were *M. aurinia*, *C. virgaureae*, *P. apollo*, *S. carthami*. The little Mountain Tortrix, *Pamplusia mercuriana*, was also common. We find these species are both high and low level species. *Tyndarus*, *eros*, *phicomone*, *darwiniana*, *pales* are certainly mountain species. On the other hand, *cinxia*, *damon*, *sebrus*, *escheri* are by no means high level species.

On the 30th July I met with *A. thersites* in another place, a rather extended locality, but with the butterfly more frequent on certain tops of knolls where Sainfoin grew freely and was in full bloom. These knolls were at an elevation of about 500 ft. above the Hospice, or say 7500 ft., or roughly 1000 ft. above the lower habitat of *A. thersites*, where both the butterfly and the flowers of Sainfoin were already going over. On these knolls most specimens were in fair condition, but the butterfly had certainly been on the wing some days, judging by the proportion of worn specimens. I estimated that the butterfly was here 10 to 14 days later than at the lower locality, some 1000 ft. lower.

On descending to Bourg d'Oisans (2360 ft.) again, on Aug. 5th, weather prevented a successful search for *A. thersites* for some days, but from 8th to 21st it was found almost anywhere where Sainfoin grew, but usually very rarely in cultivated fields. It was in fair condition and fresh specimens were found up till the last date. The Sainfoin was, in the cultivated fields, a well-grown second crop, with only here and there a few second-crop flowers. When wild plants had not been cropped they were in seed, and the seeds were quite ripe up to 1000 ft. above Bourg d'Oisans.

A day or two at Grenoble (22nd to 25th Aug.) afforded two specimens of *A. thersites* in the Uriage Valley at a point where Sainfoin occurred both wild and cultivated, but no specimens elsewhere, though a number of *P. icarus* were scrutinised. Again, an odd specimen was found close to Grenoble where Sainfoin seemed to be wild in meadows, though it may have been a survival from its cultivation a number of years before. In any other places where there was no Sainfoin, *thersites* was not seen.

One conclusion arrived at was to confirm the idea that the food-plant of *A. thersites* was *Onobrychis* (Sainfoin) in its cultivated and wild and alpine forms. The butterfly was seen to lay on it; it was most numerous where the plant grew wild in some quantity, and though it was not found everywhere where Sainfoin was seen, it was never met with where Sainfoin was absent. Quite possibly it has other food-plants, but the observations not only gave no indication of what they might be, but tempted one to the conclusion that it had no food-plant but Sainfoin. This conclusion is certainly correct for the portions of Dauphiny explored, but there may, in other areas, be some equally acceptable plant that does not occur in these valleys.

The other conclusion arrived at is that *A. thersites* is double-brooded throughout most of its range, but at Le Lautaret it is single-brooded. It was certainly somewhat of a surprise to find the butterfly at Le Lautaret as high as 7500 ft., and a specimen or two even higher. The dates of appearance were only explicable on the idea of a single brood, as the species at 7000 ft. was going over before the second brood at 2500 ft. was fully out. At Le Lautaret the butterflies were contemporaneous with the flowering of the Sainfoin, as was probably the first brood at the lower level, the second brood coming out, when the second crop of Sainfoin (where cultivated) was nearly ready for cutting.

The specimens, single-brooded from Lautaret, and second-brooded from Bourg d'Oisans, flying at the same date, but with a difference in the elevation of their habitats of 5000 ft. did not in the field, nor do they now in my boxes, present any differences that I can detect, they are about the same size. A few measured, selected as large or small, varied ♂♂ 30–43 mm. at Bourg d'Oisans, 29–35 mm. at Lautaret, but these Lautaret specimens were (accidentally) exceptional. The ♀♀ at Bourg 27–35 mm., at Lautaret 29–31 mm. The mass of specimens were between these extremes—about 33 mm. ♂♂, 32 mm. ♀♀ at both places.

At Bourg d'Oisans *A. thersites* occurred up to about 4000 ft. (still in second brood) in warm corners on the sunny side of the valley, but, though one can by no means be certain, I don't think it occurred at elevations intermediate between this and the single-brooded high level (6500 ft.).

My bred specimens (nearly a score in number, more if the probable result of larvae given away be included) are of large size ranging up to 38 mm. in expanse, the females also are large (36 mm.) with much blue marking.

Those of Le Lautaret and Bourg d'Oisans origin were not kept separate, but the whole lot are very uniform, and both sets must be represented. They are of course either of the spring emergence or of the single-brooded race; in accordance with this I find the *androconia* are of the *escheri* pattern, with a few odd scales intermixed, varying down to *thersites* summer form.

Such trifling variation presents itself not infrequently in other species, but until looked for does not modify the impression of absolute uniformity.

Mr. Francis I. Ball finds that *A. thersites* occurs in Belgium, and has allowed me to examine some specimens. I submit a separate communication arising out of his observations of these specimens.

I entertain little doubt that in Belgium, *A. thersites* is single-brooded, and is thus brought into relation with my specimens from Le Lautaret. The specimens are rather small, ranging from 29 mm. to 35 mm. in expanse, and very similar in size and appearance to specimens of *P. icarus* which accompanied them.

The discovery of a single-brooded form at 7500 ft. and over at Le Lautaret and of the same form in Belgium makes my view that *A. thersites* has somewhat Southern climatic proclivities untenable. Its rather Southern distribution is clearly not directly due to climate, but only indirectly in so far as climate affects the distribution of *Onobrychis* (Sainfoin). When an alpine form of Sainfoin occurs at a high elevation, *A. thersites* is able to accompany it.

In the Entomologists' Record, *A. thersites* is reported from Constantinople by Mr. Graves (vol. xxv, p. 139); by Mr. Curwen, and especially in a detailed paper of some interest by Mr. B. C. S. Warren from the portion of the Rhine Valley about Bex and St. Triphon, thus much diminishing the long stretch of the valley from which I previously had no records (vol. xxv, p. 253), and (p. 301). Messrs. Buxton record the species from Greece (Epidaurus, April 21st) (Ent. Rec., vol. xxvi, p. 50); these are rather small specimens, probably of the spring brood. Commander J. J. Walker has found a ♀ specimen among the remains

of his captures at Port Baklar, near the Dardanelles, in 1878 (Ent. Mo. Mag., vol. xv, pp. 193–6).

Mr. Rowland-Brown tells me he finds in his collection specimens of *thersites* from Aosta (May), Como (June), Constantinople, Damascus, Beirut, Mende (Lozere), the latter a locality more westerly than any previously recorded, though exceeded in this respect by Mr. Moore's Poitiers specimens.

Mr. Roger Verity says he has series of *A. thersites* collected near Florence and Leghorn. "It is particularly abundant in May, becoming very scarce in other seasons of the year. In fact, I had considered it a seasonal dimorphism of *icarus*, which occurred also at other times of the year when single individuals developed in particular conditions."

I find I have a specimen (♀) taken at St. Maxime.

Mr. H. Brown, writing on 24th Nov. 1913, says that in his collecting *thersites* is commoner in the South than *icarus*. As one goes North, *thersites* becomes rare in proportion as *icarus* becomes more abundant. At Fontainebleau and Lardy, which are, though very near Paris, altogether Southern localities (one finds there *Ascalaphus*, *Mantis*, *Cicada*), *thersites* is almost as abundant as *icarus*.

Mr. Harry Moore has some examples of *Agriades thersites* from Poitiers. These are to be noted as from the most Western habitat yet reported. They are also remarkable as occurring along with *icarus*, and, as happens elsewhere in the two species, resembling each other very closely in all respects. In one point, not they really, but the accompanying *icarus* are remarkable in having, in a majority of specimens, the apical orange spot of the hind-wing advanced basally nearly as in *thersites*. On the other hand, the twin spots, of the post-discal series, at the anal angle are markedly upright in the *thersites*, typically oblique in the *icarus*.

Dr. Anton Schmidt sends me specimens from the neighbourhood of Buda-Pest of *thersites* and *icarus* taken together. On the upper sides the males seem to be identical; the expanse is from 30–34 mm. Two females, one of each species, are practically identical on the upper side. Another ♀ of *thersites* is rather small, only 28 mm., and has all the appearance of a male *medon* with somewhat reduced orange spots. The only difference I can see, is the slight and perhaps doubtful one, that the faint black centres to the orange spots of the hind-wing are near the margin as in

icarus and *thersites*, not close to the orange spot as in *medon*. The underside is definitely *thersites*. Curiously enough, of a pair of what are almost certainly *thersites* (appendages not examined) from Hungary in the collection of the Hon. N. C. Rothschild, the ♀ has these black kernels disposed very much in the fashion of *medon*, in neither specimen is there any trace of blue scales, that are never present in *medon*, frequent in the other two species.

In captivity (at Le Lautaret and Bourg d'Oisans) the butterflies laid eggs freely on Sainfoin. It was necessary as with practically all these blues to place the plant on the bottom of the cage, when they appeared to lay willingly on the leaflets, especially the undersides, visiting very sparingly upright leaves and stems, rarely laying on the calyces, never (or hardly ever) on the corollas. *P. icarus* is perhaps the least unwilling of the species I know, in this regard, to lay on leaves and flowers at some height.

The eggs of *A. thersites* are of the usual Plebeiid type, like those of *P. icarus* as belonging to this type, but differing in several definite respects. It is hardly appreciably smaller. One marked difference is in the size of the individual cells of the adventitious coat, which are a third larger in *thersites* than in *icarus*, i. e. their diameters at corresponding zones of the eggs are as 4 to 3. The columns at the angles of the cells are markedly larger, higher, and bolder in *thersites* than in *icarus*. The micropylar area is much larger in *icarus* than in *thersites*. Both these circumstances are well shown in the photograph of the eggs (Pl. XXXV). The structure of the micropylar area is affected in even a larger degree than the rest of the egg, in having the cells larger and fewer, as is evident in Pl. XXXVI. I present photographs of two specimens of each species, showing that the difference is not an individual variation.

I present most of the following notes on the larvae roughly, as entered at the time. On various points I trust to plates rather than to lengthy description.

Sept. 2. Some *thersites* hatching onwards from 8th August are now in their third skins, some from eggs laid about August 18th and hatching 26th to 27th are still in 1st instar.

When newly hatched the larva is less than 1 mm. in length, nearly colourless, a pale slaty tint, and looking semitransparent, the

hairs as a line down each side of dorsum, and a lateral series are very evident and nearly as long as the thickness of larva. As the larva grows, reaching a length of 1·5 mm., or when stretched nearly 2 mm., it develops some very distinct colouring. The ground-colour is a very pale olive-green with a nearly white band along the prominence of the lateral flange. Along the dorsal tubercles (with black bases), and again just above the spiracles, the ground-colour remains as pale bands, medio-dorsally is a broad pale brownish band hardly interrupted at the incisions; between the two pale bands each segment has a pale brownish patch of same colour as the dorsum, as are all the dark portions, or rather four small patches, one at each corner of the area, the two dorsal ones touching each other, the other two separate and having the lenticles medially on a pale area, the spiracles are each on a pale area, but surrounded by a dark nearly square patch, which is, however, sometimes actually, at others nearly, obsolete just over the spiracle, connecting the pale spiracular patch with the pale band above it, the prothoracic plate is pale and the skin points are everywhere obvious as minute black points, the hairs are colourless, glistening and spiculate, their bases and the lenticles are black and conspicuous on the paler skin.

When we compare the armament of hairs, lenticles, etc., of the 1st stage larvae of *icarus* and *thersites*, it seems at first impossible to detect any difference; there is, however, a trifling difference, in that the hairs on *A. thersites* are about an eighth longer than on *P. icarus*. So small a difference is rather astonishing after the very marked difference in the eggs, but is not really so when one observes that these larvae cannot be distinguished from those of *bellargus* and *coridon* and even *semiargus*, by any greater differences.

Pl. XXXVII and XXXVIII show the skins of the two larvae of the two species at this stage.

Sept. 5. In the 2nd instar the larva is about 1·5 mm. long approaching 2·00 according to attitude and age in the instar. In form the dorsal flanges stand out more prominently, with a flat dorsal plane between them and very definite side slopes, each rather flat, from the dorsal to the lateral flange and at an angle of about 90° to its fellow. The dorsal plane has just a trace of a central depression or valley emphasised by the large hair bases on the flange, the plane is nearly twice as wide in front (on mesothorax) as behind (on 7th abdominal), narrowing from before backwards. The hairs are more numerous, with large black bases and nearly colourless, much spiculated shafts, the colour is dark olive green, compounded of faint ochreous (pale)

pale reddish brown (dark) over greenish contents. The dorsal trough is dark, the dorsal flanges (apart from hair bases) pale. The subdorsal and supra-spiracular areas are still separated by a pale line or band, but this and the pale spaces in the two areas are smaller and less defined, so that the dark areas much predominate; below the spiracle is a dark area, then the pale lateral flange and a dark area below this, the venter being pale.

The increased armature of hairs, lenticles, etc., is shown in the photograph of the skin in this (second) instar on Pl. XXXIX.

Sept. 5. In 3rd instar it has a length of about 3 mm. (at rest) or up to nearly 4·00 if stretched; the hairs are more numerous, but proportionally (and actually ?) shorter than in 2nd instar.* The outline is much the same, both in this and previous instar it is less angular and more rounded as the larva feeds up. The colouring is very similar; there is the pale flange line, and from the posterior end of this (on each segment) a pale line passes obliquely downwards and forwards; there is the pale lateral flange line, a pale area round spiracle, and the pale intermediate line still exists, but is hardly recognisable as a line, and there is a pale patch between this and the oblique line, usually attached to the lower margin of the front end of the oblique line. The honey-gland is distinct as a transverse line with 8 or 10 hairs and lenticles round it, but not close to it.

The armature of hairs, lenticles, etc., is shown in Pl. XL. It will be noticed that the hairs of the dorsal and lateral flanges, and of the minor series half-way up the flange, are more definitely separated from each other by a considerable increase of the smaller intermediate hairs.

Pl. XXVI shows larvae at this stage. Figs. 1, 2, 3, of *P. icarus* and 7 and 8 of *A. thersites*.

Sept. 13, 1913. *A. thersites*. One specimen moulted to 4th instar on 8th and another since (11th?). They are now very short thick fat larvae; the smaller 4·5 mm. long, 2 mm. wide, 1·7 mm. high (contracted and sulky); the larger 6·0 mm. long, 2·2 mm. wide, 1·8 mm. high. Dark glaucous green, with indications of a yellowish line in each dorsal flange and a little less indistinct yellow lateral flange line, a line of rather darker marks above spiracles and a lighter green (yellowish oblique) line bordering this above, and a parallel one higher up, starting from dorsal

* Their greater length does not exceed the proportion of 8 to 7, a proportional increase would be as 5 to 3.

line (flange) at front of segment, each oblique downwards and backwards, hair points black, hairs numerous, not conspicuously longer on flanges, under surface paler, prothoracic plate deeply recessed, and so conspicuous, but not by colour, honey-gland not conspicuous, but fans indicated by a yellowish point. Head black, true legs have some dark bands on plates, but have a larger green area.

Pl. XXVI. Figs. 9 and 10 show larvae that attained this stage before hibernating. Fig. 11 one that reached this stage after hibernating in 3rd instar.

Sept. 22. The two larvae that had fed up in 4th instar and seemed to be thinking of another moult, appear to be in reality laying up for hibernation, these two were from Lautaret eggs. Three other larvae from Bourg d'Oisans eggs have also entered their 4th instar.

Sept. 28th. The three last 4th instar larvae are ceasing to feed, possibly for moult but more probably for hibernation, the two first are still quiescent; it would thus appear that the mass of larvae hibernate in 3rd instar, but that some 5 per cent. or so do so in 4th instar.

Amongst the last *thersites* eggs to hatch, a larva emerged on Sept. 7.

Hatched, Sept. 7.
Moulted for the first time, Sept. 14.
Moulted for the second time, Sept. 22.
Moulted for the third time, Sept. 30.

It then fed on and was found to be lethargic about Oct. 10. It was hoped it was going to moult for a fifth time, but it turned out that it was taking up the attitude for hibernation.

The advance of certain larvae to the 4th instar before hibernation led me to hope that some were going to complete their transformations in the autumn; this proved not to be the case.

It is worth noting that both Lautaret (7000 ft. single-brooded) and Bourg d'Oisans (2600 ft. from second brood) larvae passed on to 4th instar in autumn and hibernated so. In putting them in refrigeration for the winter I did not keep the two sets of larvae any longer separate, but when brought out and fed up, there were no differences observed to cause regret at this oversight.

It is very probable that other Lycaenid larvae hibernate in more than one instar, and this may account for discrepancies between the reports of different observers, but I think this is the first instance in which the fact has been unmistakably proved.

When settling down for hibernation the larvae spin a little carpet of silk, to which they hold very firmly, so that if an attempt be made to remove them, it is more usual for the silk to come up with the larva than for it to be left behind. I was no doubt rather unkind in the matter of providing hibernacula, so can only report generally that they seemed to desire to get as low as possible and under some cover, as inside a curl of a dead leaf. I imagine that naturally they settle down on some dead material still attached to the root stock of their plant. Of some larvae placed on living plants and left out of doors several survived and must have been in some such place, as they duly appeared on the leaves of the plant when it was brought indoors.

When the larvae had settled down for hibernation I placed them (towards end of September) in a refrigerator, with temperature from 34° to 36° (Fah.). There was a considerable mortality (vastly less, however, than amongst *eros* in precisely the same circumstances), but I got a good share through. I brought them up about the end of December and beginning of January, and found they became active and began feeding in a few days.

I pursued this course to diminish the loss during hibernation and was encouraged by the mild winter that made it possible to get Sainfoin in satisfactory condition. Luckily no hard frost set in after I had committed myself to this course.

Sainfoin is not now cultivated in the immediate neighbourhood of Redhill or Reigate, and I have to thank gratefully several friends who assisted me in finding the plant and for supplying me with it, until I had ascertained such localities.

The following notes were made in regard to the larvae after their abbreviated hibernation. They were kept in a room usually about 60° to 66°, but sometimes down to 55° at night; under these artificial circumstances dates are of little account, though affording some indication of rate of growth, etc.

Thersites.

Dec. 18, 1913. Brought up from refrigerator two larvae hibernating in 3rd instar.

Dec. 21. One of these has commenced eating.

Dec. 25. The first has been feeding regularly and has eaten the parenchyma of a good share of 3 or 4 small leaves about 5 mm. long; it does not show any very definite difference in size and appearance. The second began to eat yesterday in the same sparing manner as the first began; they leave the upper cuticle of the leaf. Brought up a 4th instar larva from refrigerators yesterday.

Dec. 26. Two first larvae feeding, the third does not look very happy, but moves about a little; it has not commenced to eat.

Dec. 27. No. 3 began to eat last evening and has by this evening made a considerable mark ($\frac{1}{3}$ to $\frac{1}{2}$) on a leaflet over half an inch long, it leaves the upper cuticle. The other two are quiescent (for moult?).

Dec. 30. One of the two did some further eating on 28th. The 4th instar specimen made inroads on two small leaves last night; so far as appears this evening all are resting.

Jan. 2, 1914. 10 *a.m.* One of the smaller larvae has moulted into 4th instar. The larger specimen (laid up for moult) is very cryptic. I have not been able to see it for several days. To-day removed leaves from box one by one and couldn't see it, nor on going over them again; but finally saw it under a small leaflet, with which it agreed in size, and with the adjoining ones in tint and colour.

Jan. 4. 4th instar larva found this morning moulted into 5th instar, colour dark greyish or olive green, with longish pale silky-looking hairs rather abundant along dorsal and lateral flanges, also below flange and some rather shorter ones extending down slope a little way from dorsum, rather in the incisions. No definite dorsal or lateral lines.

Jan. 9. 4th instar larva is now a good size, when contracted 11 mm. long, 4·3 mm. wide, and 3·5 mm. high. Very uniform in colour, a deep blue green, a barely darker dorsal line, and a very fine yellow thread deeply placed as lateral line; the silvery hairs are still a feature of the larva, but are now spread enough not to be conspicuous.

The second larva appears to be laid up for last moult.

Jan. 11. Large larva seems nearly full grown, it is at least large and skin tight and shining. The yellow lateral line is more visible than it was (more so from below), and is very slender. The colour is a bluish green, it is 11 mm. long (retracted) and about 5 mm.

broad, and quite 5 mm. deep. Many of the hair bases are black, but the long hairs are conspicuously white, on lateral view, the dorsal prominence of each segment has a crest of these silvery hairs. The prothoracic plate is well marked out and shows conspicuously black hair-bases. The fan-positions are white spots, the honey-gland looks like a small smooth area surrounded by a close line of hairs or lenticles, on a darker ground the dorsal view shows a fringe of silvery hairs laterally similar to the dorsal crest. There is a third range of such hairs half-way between lateral line and prolegs.

Jan. 12. Seems to be looking for a place for pupation. No. 2 still laid up for last moult.

Jan. 14. No. 1 has settled (?) in a corner of box.

No. 2 moulted last night into 5th instar, prothoracic plate dark from hair-bases, hairs very bright and silvery.

Dec. 30, 1913. Brought 14 3rd instar larvae from refrigerator into warm room (54°–56° night, 66°–68° day temperature, sometimes near 70°).

Dec. 31. Two larvae have already made marks on the leaves provided, one having an area of quite two square mm.

Jan. 1, 1914. About 7 or 8 appear to be feeding.

Jan. 7. One larva has moulted into 4th instar.

Jan. 12. There are now 12 of these larvae, nearly all in 4th instar.

Jan. 13. Several of these larvae show a distinct yellow line down each dorsal flange.

Jan. 6. Brought up 3rd instar *thersites* and two 4th instar.

Jan. 7. One (at least) of 3rd instar is feeding.

Jan. 12. All above grown, and most now laid up for moult.

Jan. 14. One of 4th instar moulted to 5th, hairs very silvery and white.

4th instar. Description from a larva reaching this stage after hibernation. Length 7 mm., width 3 mm., height 2·5 mm. Is very like full-grown, last-skin larva in dark green colour, more or less obscure yellow lines; when laid up for moult shows the same flattened plateau ranging over segments to 6th abl. on slopes, level and polished, and with the hollows within on each segment. It differs from the last skin in the hairs, including a good many dark ones especially on dorsal ridges, and in the black hair-bases being more conspicuous.

Last instar, half grown.

Length 12·5 to 13·0 mm., width 4 mm., height 3·8 mm. Colour bluish green, with indications of yellow dorsal and lateral (very narrow) sunk lines, a faint indication on each segment of 3 pale lines obliquely downwards and backwards. Hairs white, except on thorax,

where they are somewhat fuscous, the hair-bases are black on some of them, some appear to be white or the effect is of the short white hairs, which are very noticeable on lower parts of slope and on last four segments; head black, legs pale with black marginal line to joints. The upholstered hollows are without the raised flat margin seen when quite full grown.

When first moulted to last skin the white hairs are massed together and have a very brilliant silvery look, at first all are very white, but after, say, twenty-four hours, those on thorax are shaded with fuscous.

In some specimens the prothoracic plate looks dark, but this is due to dark hair-bases.

Side by side the green colour is very similar to that of *icarus*, but in *icarus* is slightly paler and yellower.

Jan. 24. Full grown.

Length 11·5 mm. when contracted, 4 mm. high, 5 mm. broad, rather dark bluish green, with faint suggestion of yellow sunk in dorsal ridges and more distinct very narrow lateral line yellow, but so sunk as to be almost greenish. Mesothorax projects hood-like over prothorax (when contracted), with 7 following segments it forms the 8 dorsal humps (as seen laterally), seen endwise the dorsal furrow is shallow, but hairs make the ridges look higher and the furrow consequently deeper than it is. On each segment to 6th abl. the "slope" has a raised centre from dorsal ridge to below spiracle, in this are three depressions, an upper, a middle (rather behind them) and a lower, in which is the spiracle. The depressions ("upholstered" hollows) are connected together sufficiently to give the raised area rather the appearance of a marginal cincture. This condition is often exaggerated when the larva is quite mature (Pl. XXXII, figs. 7, 8.) The honey-gland is an obscure narrow line, the positions of fans obvious, spiracles hardly different from ground-colour, white of hairs less brilliant than before being full fed.

In the last skin some specimens as they get full grown show a slight rufous tint on the white hairs and specimens differ a good deal in the visibility of the yellow dorsal and lateral bands. In the last skin, they are fond of eating the petioles of the leaves.

The feature of the larva in the last instar is the white or silvery haze round it and over it from the whiteness of the hairs, which remains so till the larva is quite half grown in this instar, when growth separates the hairs and diminishes the effect, and as it gets full grown, the hairs

become faintly rufous. The light aspect of the larva is assisted by the greater abundance of medium-sized hairs as will be seen in Pl. XLVI. (Pl. XXVI, fig. 12, and Pl. XXVII.)

Mr. Main's photographs of the larvae and pupae of *A. thersites* and *P. icarus* are very instructive in some points, and so I present them. They are in several instances stereoscopic, and the figures are placed close enough to be easily combined without the aid of a stereoscope. They are all $\times 2$.

They bring out very distinctly the much brighter appearance of *A. thersites* (larva) owing to the absence of dark hairs on the abdominal segments and the greater abundance of the larger secondary hairs. The pupae of the two species are very much alike, the larger size of the *icarus* pupa shown is an individual not a specific difference.

When first moulted into last instar *P. icarus* has white hairs except on thorax (like *thersites* mature plumage), but in a few hours, some 7 or 8 hairs on either side of each segment on the dorsal ridge become black, and most of the long hairs on the lateral flange become nearly black, often in both cases remaining pale close to the body. The pale spiracles are more conspicuous, and the yellow dorsal and lateral lines are barely to be detected. (Pl. XXVI, figs. 5 and 6.)

The photographs of the honey-gland region of *thersites* and *icarus*, Pl. XLVI, are from specimens that agree with several others of each species in showing certain differences that may be taken to be constant in the last instar.

In *thersites* on the dorsum of 6th abdominal segment are 5 long hairs on each side, in *icarus* at least twice as many, on 7th *icarus* has two strong hairs above spiracle that are wanting in *thersites*, which also has none on dorsum of 8th where *icarus* has a pair. On the other hand, *icarus* has a very moderate supply on these segments of medium and small hairs, compared with their abundance in *thersites*.

The photographs of dorsal hairs (Pl. XXII) are difficult to compare, for it so happens that the skin of *icarus* is spread or stretched nearly twice as much as that of *thersites*; so that only the posterior half of the segment is shown of *icarus*, the whole width of the segment in *thersites*.

They show, however, that the long hairs of *icarus* are longer than those of *thersites* (about 0·6 mm. to 0·48 mm.), that smaller hairs are much more abundant in *thersites*,

and that in *thersites* the bases of the smaller hairs are much more stellate in this region, differences that other specimens support.

The other photographs probably explain themselves as well without as with a description.

Pl. XLV is perhaps interesting as showing how much clearer a cast skin (when it can be unravelled) may be than a prepared one.

Perhaps the very good presentment of the special angular hairs of the prothorax on Pl. XLII and XLIII are worth noting.

Jan. 31, 1914. Newly moulted pupa.

Length 10·5 mm., a slight waist at 1st abl. 4·5 mm. from anterior end, height at mesothorax 4·0 mm. and to waist, thence rising to 4·5 mm. at 4th abl. Thoracic width 4·0 mm., increasing from waist to 4·3 mm. at mid abdomen (3rd and 4th segments). Colour rather olive green, darker dorsal line, which is really dorsal vessel, and can be seen to pulsate about 27 in a minute, actual darker spots occur half-way between dorsum and spiracles, associated with a slight hollow; one of this series occurs just above wing-base on mesothorax, head, wings and appendages are a paler more pure green, rather transparent, the wings very much so, all the tracheae being very distinct.

The larval skin adheres to last segment, the pupa is otherwise free and the skin happens to have retained no hold.

Feb. 3. There are now three pupae and the most of the remaining larvae are quite full fed or fixed up. Saw one specimen completing its moult to pupa. This one and another larva had a " girth " consisting of apparently only one strand of silk; several had some traces of silk on adjacent leaves, as for an abortive cocoon; one or two were placed where no material for a cocoon was available, and one or two appeared to spin no silk at all. Some remain a slightly darker duller green up to pupation, one or two assumed quite a dark tint.

Feb. 3. Of half a dozen larvae placed on plants in the open, three are found alive, two in 3rd and one in 4th instar.

Feb. 9. All the indoor larvae have pupated, except one or two that are laid up for pupation. There is, how-

ever, one exception, this is a larva that is at rest on a leaf of Sainfoin and has been so for over a week, and was possibly more or less at rest for some time before, but was only noticed as failing to grow. It seems to be in 4th instar, and its procedure seems to suggest that it thinks it ought to hibernate. It is in same room as others 59°–61° night, 61°–70° day temperature.

Nine days later this larva died. It probably wished to hibernate, but the temperature was too high.

Feb. 13. Examining a number of pupae shows some little variation in colouring, to some extent due to differences in maturity, the tint is usually a very light olive green, verging to pale ochreous, with the head almost always pale brownish, contrasting with the rest of the pupa; the wings are paler, or rather more colourless, at first transparent with greenish contents, later looking more solid and white, one specimen has quite a pink shade along all incisions. The dorsal vessel in mature pupae is narrower and looks more deeply sunk in more solid tissues and contractions are not evident, the mature pupa does not show the subdorsal spots noted in the newly changed pupa. In most but not in all specimens the larval skin is adherent to the last segments.

Some trace of cocoon is usually present. The larva gets beneath some leaves or paper (these were the only materials provided), and attaches these together with a good many threads, but really a trifling amount of silk altogether, and usually several threads may be called a girth; these are more evident when the larva is more exposed and "a cocoon" is absent, even four or five threads occur, but all separate, mostly only one or two. No feature evident to the unaided eye or even by aid of a hand lens distinguishes the pupa from that of *icarus*, or except size from *coridon* or *thetis*.

Feb. 26. A pupa that had turned practically black, as all do as the period of emergence approaches, showed a series of ochreous marks along the wing margins exactly suggesting the orange spots of the ♀, this was yesterday; this morning it has emerged, a ♂.

Feb. 28, 11 *a.m.* A pupa close on emergence shows the orange spots of the ♀ unmistakably and must necessarily be a ♀, in places the black colour has given place to a pale and greyish tint, chiefly over the abdomen and wing-bases, this change is due to the hairs and scales more or less

parting from the pupa case and some air being present between; this pupa shows the abdominal incisions 2–3 (doubtful), 3–4, 4–5, 5–6 and 6–7 (distinctly) open dorsally, 4–5 and 5–6 all round. By "open" I mean the stretching that occurs at this stage, when the adjacent segments are "free."

This pupa emerged at 11·55.

Another pupa (3 *p.m.*) shows very evidently the underside spotting of the upper wing, two others very dark, about same stage, show only uniform black colouring.

For 24 hours before emergence the ends of the antennae are seen to recede about 0·3 or 0·4 mm. from the extremities of their cases.

Feb. 22. First butterfly (♂) emerged. This not from the earliest larva, as it died when laid up for pupa, probably from being kept too dry.

Feb. 23. Two larvae that passed the winter out of doors are now full grown; one has very distinct and bright, but slender yellow lines along the dorsal and lateral flanges, as usual looking like threads sunk some way beneath the surface.

The dates of emergence are (not including larvae started at later dates) as under. These are only of interest as showing relative proportions and dates of emergence of the sexes.

	♂	♀		♂	♀
Emerged Feb. 22	1		Emerged March 1	1	1
,, ,, 25	1		,, ,, 3	1	1
,, ,, 26	2		,, ,, 4	1	
,, ,, 28		1	,, ,, 5	3	
			,, ,, 6	2	2

After these I had two males emerge and from larvae given to friends 1 male and 3 females appeared, making 15 males and 8 females.

Feb. 28. 11.55 *a.m.* Observed the emergence of a butterfly, a ♀. The thorax split dorsally, and by the usual vermicular movements of the abdomen, the abdomen progressed forwards, pushing the thorax in front of it, but the head remained capped by the pupal headpiece, so that the effect was to bend the butterfly in such a way that the thorax protruded dorsally, the pupal thoracic pieces being forced widely to each side, until the wings

became largely exposed on either side, and the forward segments of the abdomen; during the later part of this evolution, the wings several times at intervals made jerking movements, as if the butterfly thought it could fly.

The bending back of the butterfly was during this same later stage accompanied, or one might say relieved, by a bending forward of the front of the pupa, made easier by the wide dorsal opening of the thorax. Suddenly the object of the wing jerks became evident, as on one of them the head slipped clear of the pupal headpiece, as a result of the sudden shake, and the legs at once came out and in a couple of seconds the butterfly was clear of the pupa, and in about 7 minutes more the wings were fully expanded. If I have made the effect of the bending process clear, it will be realised that it had only to go a certain length, for the head to slip out of the cup-like pupal cover; the jerking process obviously made this occur distinctly earlier but it would have happened without it. The wide dorsal opening of the thorax was very striking in view of the empty pupa case taking so closely the form of the living pupa.

There is considerable variation in the time taken in expanding the wings, from 7 or 8 to 15 minutes, and also in the method of escaping from the pupa. As the pupa matures the wings assume an ivory opacity with a somewhat yellow or sallow tint, and the head, thorax and abdomen become dark, gradually the whole pupa becomes nearly black, but the blue tint of the wings is often visible and the rings of the antenna; this condition exists for about 24 hours, when air begins to show itself between the insect and the pupa case, first usually about the wing-bases, then spreading down the wings, but usually leaving the hind margins of the wings touching the pupa case after all other areas are practically separate from the case. The presence of air is quite obvious, the dark pupa becomes much paler where air is present and shows the ochreous pupa case separate from the darker underlying insect; this condition may be some further 24 hours in establishing itself. Then for perhaps as much as two or three hours before emergence, the incisions between the segments become extended.

The emergence of a specimen was again noted at noon on March 6. The pupa showed the case as pale, somewhat separate from the insect beneath, the hairs over the ab-

domen and the wing colours being evident. The incisions behind abdominal segments 2, 3, 4, 5, 6, and 7 were extended, the last not quite so evidently as the others. This extension is no doubt achieved by inflation of some internal spaces with air. The pupa was stimulated by placing it in the sun and at 12.10 the mesothorax slit down the back and some blue hairs, apparently quite dry, appeared. These showed some jerky movements as if the insect were trying to flutter its wings, but no sign of peristaltic movement was observed, the hairs of the abdomen maintaining their positions within the pupa case quiescent and unchanged. At 12.14 the prothorax was obviously slit, and the line of hairs was rather wider, occasional fluttering movements continued, and at 12.15 the head was free, the dorsal slit not widening as in the emergence previously observed, and the head freeing itself before the thorax had made any very obvious advance, and whilst the terminal segments had in no degree left the hinder segments of the pupa. At 12.15 the legs were free and the insect had quite left the pupa case at 12.17. Up till the freeing of the legs, which then assisted the emergence, the process seemed to be entirely by expansion of the bulk of the insect and not as a result of segmental or peristaltic movements; more air being secreted inwardly, or that already there expanding under increased temperature. At 12.27 the wings were fully expanded. Some small drops of turbid, but not thick fluid were expelled shortly after emergence and again after the wings were expanded, but there was no deposit in the pupa case, nor in any other pupa examined.

A ♂ emerged on March 3rd that varies by having the spots beneath very weak, of the first discal row of hindwing, the 2nd is a mere dot, and the 4th and 5th (in white dash) and the 7th and 8th are absent. (Pl. LI, fig. 1.)

I had given up the pupa of this specimen as ill or dead some days previously. Several days before, when the wings were in the ivory stage, one wing-base, about a fourth of the wing, became nearly black, when one would have expected both wings to become so all over in ordinary course, and things remained so for at least two days, and the blackness was attributed to one of the fatal disorders with such change of colour beginning at one place, to which larvae and pupae of Lycaenids are liable; then quite the wing-base on the other side became black, and next

day the whole pupa darkened, but one could not guess whether owing to the extension of ailment or to the ordinary progress of development before emergence, the latter proved to be the case. The original black patch must therefore have been a precocious maturing of the one portion of wing, owing to some cause that also produced the variation noted in the imago.

The presence in the pupa of a dorsal headpiece is evidence that the pupa is not highly evolved, but the opening for emergence of the abdominal incisions before the 4th shows a more primitive condition than occurs in any obtect pupa of the *Heterocera*.

The pupa of *A. thersites* presents at least as great an elaboration of the maxillary pocket as I have noticed in any other pupa, which has led me to observe certain facts in connection with it that I ought to have seen before but overlooked. (Pl. LII. and LIII.)

I first called attention to this "pocket" in Tutt's "British Lepidoptera," vol. x, p. 226, and in the Ent. Rec., vol. xxv, p. 165, I related how it is formed as observed in the pupal moult of *Agriades coridon*.

The overlooked circumstances are, that the intersegmental membrane of the two following incisions presents certain involutions and persistences in some species, that do not seem directly associated with the present development of this pocket; these are well marked, for example, in the pupa of *A. bellargus*, in which there is a very definite and symmetrical fold in the next (5–6) incision just below the pocket and a longer but shallower one in the following incision (6–7, abdominal segments), and similar involutions, on a slightly smaller scale in the same three incisions half-way between the mid-ventral line and the spiracles. It is not easy to suppose these latter have any direct relationship to the pocket.

In my original figure of the pocket in *P. argus* (*ægon*),* the extremity of the pocket and two obvious folds in the next incision, suggest a strong approach to the condition in *A. thersites*.

In *A. thersites* the involutions of the membrane, as what may be called subsidiary pockets, are almost exactly the same as described above in reference to *A. bellargus*, where the development of the pockets between segments 5 and 6 is very easily seen.

Though I call these pockets they are really merely folds, *i. e.* the two walls touch one another and contain no cavity. This second pocket in *A. thersites* is very large and looks at first glance as if

* Tutt's Br. Lep., vol. x, Pl. XXXIII, reproduced Ent. Rec. *l. c.*

the end of the true pocket entered it, since the pocket is so long as to overlap it. In *A. thersites* the extremities or extreme tips of the antennae also enter the pocket. This is probably the case in other pupae of this group in which the ends of the antennae terminate, not in a point, but by a square end as seen on the pupal exterior.

I do not know how the imaginal skin over the venter of the fifth abdominal segment frees itself from this pocket, no trace of this condition exists in the imago, unless the circumstance that the ventral plate of the fifth abdominal segment is the smallest of the series has some relation to it.

Explanation of Plates XXVI, XXVII.

[*See Explanation facing the* Plates.]

Explanation of Plates XXVIII–LIII.

Plate XXVIII. Top of the Valley of the Guisane, just below Le Lautaret, showing (+) habitat of *A. thersites* at about 6400 ft.

Plate XXIX. Looking down on Le Lautaret from the west, where *A. thersites* occurs at about 7000 ft.

Plate XXX. One of the low ridges west of Le Lautaret where *A. thersites* occurs at about 7500 ft.

Plate XXXI. Photographs of larva by Mr. H. Main.

Fig. 1, *P. icarus*; figs. 2, 3, 4, 5, *A. thersites*; × 2.

The most striking difference between the last stage larvae of *thersites* and *icarus*, as seen by the naked eye or with a low power hand lens, is that the dorsal hairs on the abdomen of *thersites* are colourless, and often glisten like silver, whilst those of *icarus* include many black hairs.

In this and the following plates, the white hairs distinguish *A. thersites*, and give *P. icarus* a dull dingy aspect in comparison.

Plate XXXII. Photograph by Mr. H. Main.

Figs. 1 and 2, as also 3 and 4, are stereoscopic of *A. thersites* larva (full grown) × 2.

The pupae are also stereoscopic by pairs × 2.

Figs. 5, 7, 9, 11. *P. icarus*; figs. 6, 8, 10, 12, *A. thersites.*

The different size of these pupae is an individual accident.

Plate XXXIII. Figs. 1, 2. Larvae of *P. icarus*, stereoscopic.
3, 4. Larvae of *P. icarus*.
5, 7. *P. icarus*, pupa.
6, 7. *A. thersites*, pupa, stereoscopic, in pairs, all × 2.

Photo by Mr. H. Main.

Plate XXXIV. Figs. 1, 2, 3. Imago of *A. thersites* from life.
4, 6. Pupae of *P. icarus*.
5, 7. Pupae of *A. thersites*, × 2.

Photo by Mr. H. Main.

Plate XXXV. Left side of Plate. Eggs of *A. thersites* × 60 and × 30.
Right side, *P. icarus* similarly magnified.

Plate XXXVI. Micropyles × 350.
Figs. 1, 2, *A. thersites*; 3, 4, *P. icarus.*

Plate XXXVII. Skin of 1st stage larva of *A. thersites* × 60.

Plate XXXVIII. Skin of 1st stage larva of *P. icarus* × 60.

Plate XXXIX. Skin of 2nd stage larva of *A. thersites* × 60.

Plate XL. Skin of 3rd stage larva of *A. thersites* × 30.

Plate XLI. Skin of 4th stage larva of *A. thersites* × 16.

Plate XLII. Fig. 1. Skin of prothorax of last stage larva of *A. thersites* × 35.
2. Prothoracic plate of same specimen further enlarged × 100.

Plate XLIII. Fig. 1. *A. thersites*, last five segments of larva in 4th stage × 35.
2. A proleg of full-grown larva × 100.

Plate XLIV. Fig. 1. *P. icarus.* Prothoracic plate last instar (to compare with Pl. XLII, fig. 2) × 100.
2. Last four segments of 4th instar, from a cast skin. The 4 spiracles will give the correct orientation.

PLATE XLV. *A. thersites.* Honey-gland region × 100.
FIG. 1, from a skin cast at pupation.
2, from a prepared skin.

PLATE XLVI. Honey-gland region, last instar × 35.
FIG. 1, *A. thersites.*
2, *P. icarus.*

Many more small hairs and lenticles are present in *thersites* than in *icarus*, but various large hairs present in *icarus* are wanting in *A. thersites.*

PLATE XLVII. Dorsal hairs of 3rd abdominal segment × 100.
FIG. 1. *A. thersites*, whole width of segment.
2. *P. icarus*, posterior half (only) of segment.

The comparison is difficult by the skin of *A. thersites* having been less extended than that of *P. icarus.*

PLATE XLVIII. Pupa of *A. thersites.*
FIG. 1 shows the dorsal headpieces consisting of two fusiform portions attached to front of head × 44. In other specimens these pieces are attached to prothoracic piece, as is in other species the rule.
2. Portion of sixth abdominal segment showing rosettes, which are not abundant on this pupa × 200.

PLATE XLIX. Pupa of *A. thersites.*
Region of (Fig. 1) fifth and (Fig. 2) sixth abdominal spiracles × 100.

PLATE L. Pupa of *A. thersites.*
FIG. 1. Cremastral area of pupa (♂) × 44. Shows sundry hairs but no trace of hooks.
2. Scar of honey-gland × 100.

PLATE LI. Photograph by Mr. Hugh Main.
Upper- and undersides of four bred specimens of *A. thersites* and of two, ♂ ♀, of *P. icarus* from the same locality as the *thersites.*

No. 1 ♂ *thersites* is a variation on the underside by diminution of spots (p. 303).

No. 2 ♂ is a variety of upperside by paleness towards wing margins, and prominence of veins between pale patches. These four specimens are now in B. M., South Kensington.

Plate LII. Fig. 1 shows the pocket in *A. thersites* as well as the one opposite its apex in the following incision, the lateral folds of the membrane, in both incisions, happen to be folded upwards, which demonstrates that they are free from the pupal wall both above and below them. They may be compared with Fig. 2, which shows the same folds in the pupa of *A. bellargus* (*thetis*). The pocket in this specimen happens to be folded upwards and not well in focus; the lateral folds and those of the following incisions are well seen. × 25.

Plate LIII is a view of this portion of the pupa of *A. thersites* from the inner surface taken stereoscopically, and so viewed shows these structures very clearly. I have numbered the abdominal segments, and have placed a letter (*a*) pointing to the pupal membrane lining the inner wing surface, which might puzzle one not used to these pupal details.

Though the greater width of these folds in one position than in another, suggests that it must be so, actual observation shows that the opening of the incisions, which occurs on the dorsum of the pupa, already referred to, does not occur ventrally, and that these folds are in no way related to such extension of the segments at dehiscence.

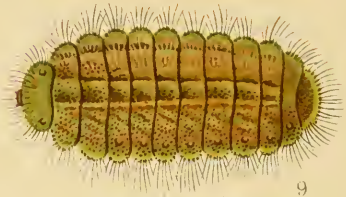
1

7

2

8

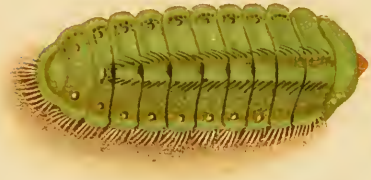
3



9

4

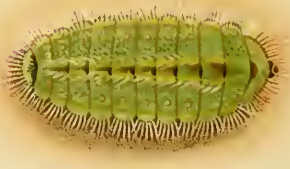
10



5

11

6



12

E.C. Knight del

West, Newman chr.

LARVAE OF PLEBEIUS ICARUS AND AGRIADES THERSITES.

Explanation of Plate XXVI.

Figs. 1, 2, 3. *P. icarus* in October before hibernation (1913) in 3rd instar.

,, 4, 5, 6. *P. icarus* in last stage in January 1914 (forced).

,, 7, 8. *A. thersites* larvae in 3rd instar.

,, 9, 10. *A. thersites* larvae in 4th instar before hibernation.

,, 11. *A. thersites* larvae in 3rd instar after hibernation in 3rd instar.

,, 12. *A. thersites* larvae after hibernation recently moulted into 5th (last instar).

Explanation of Plate XXVII.

Figs. 1–6. Various aspects and colourings of larvae of *A. thersites* in last stage.

„ 7, 8. Larva when quite full fed and ready to seek a place for pupation, the "slope" becomes as if smoothed down to a level surface, cut into by the incisions and with a hollow of somewhat figure-of-8 form on each segment.

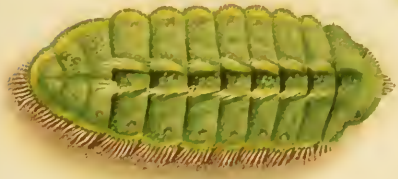
The figures in Pl. XXVI and XXVII are much enlarged, but nearly the same in each case, about 4 or 5 diameters or (in the younger larvae) rather more.

1

4

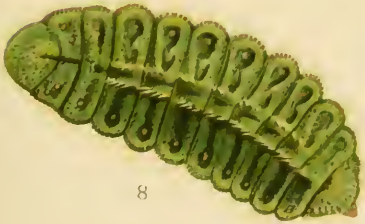
2

5



3

6



8

7

E.C.Knight del

LARVA OF AGRIADES THERSITES

C. Hentschel.

GUISANE VALLEY BELOW LE LAUTARET.

C. Hentschel.

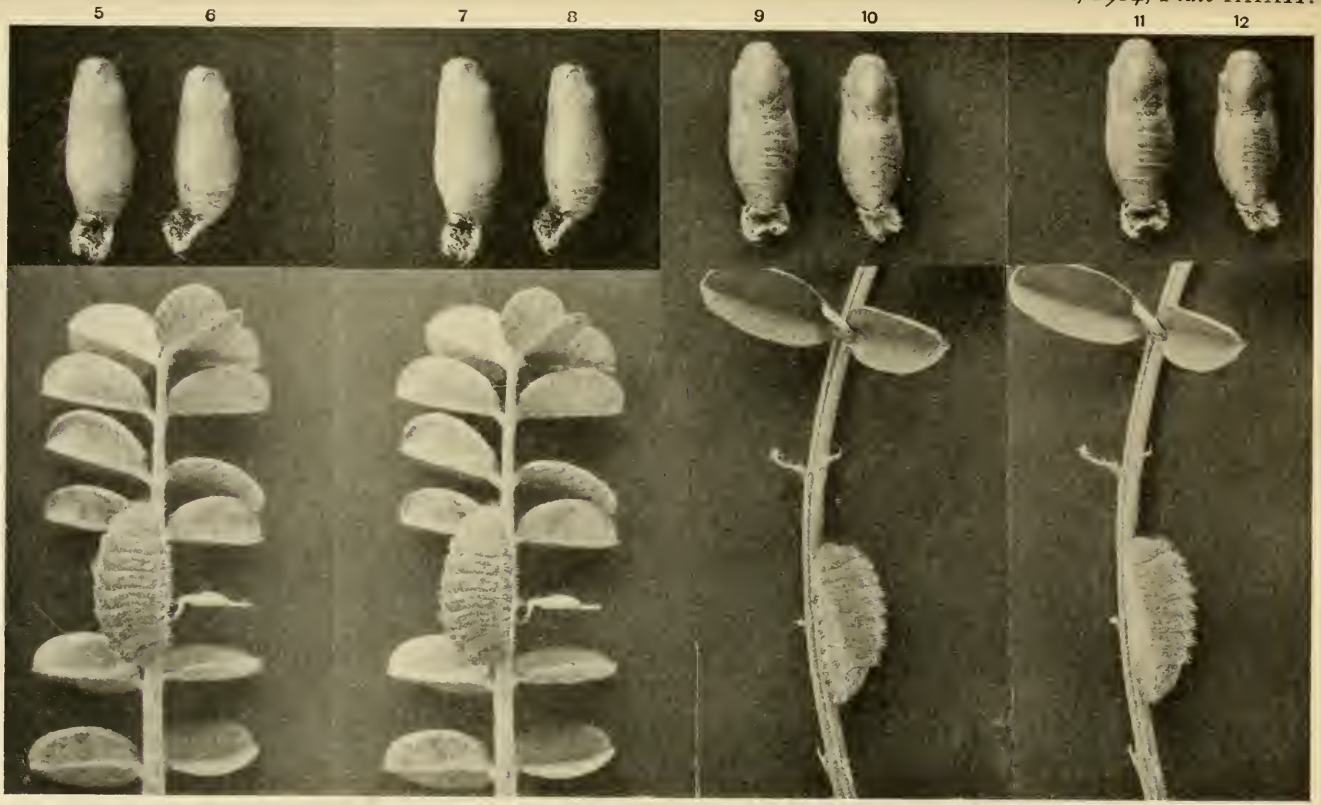
LE LAUTARET FROM THE WEST.

C. Hentschel.

LE LAUTARET, HABITAT OF A. THERSITES AT 7,500 FT.

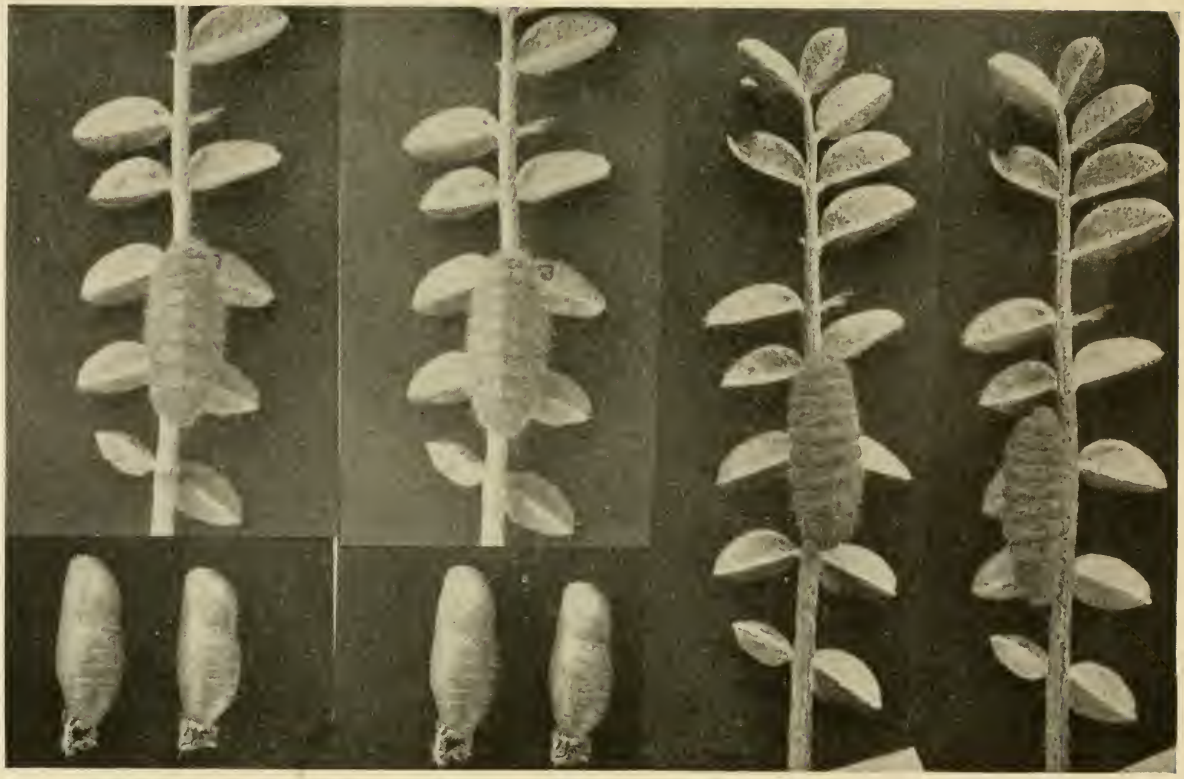
Photo, H. Main *C. Hentschel.*

LARVAE OF 1 P. ICARUS AND 2–5 A. THERSITES.



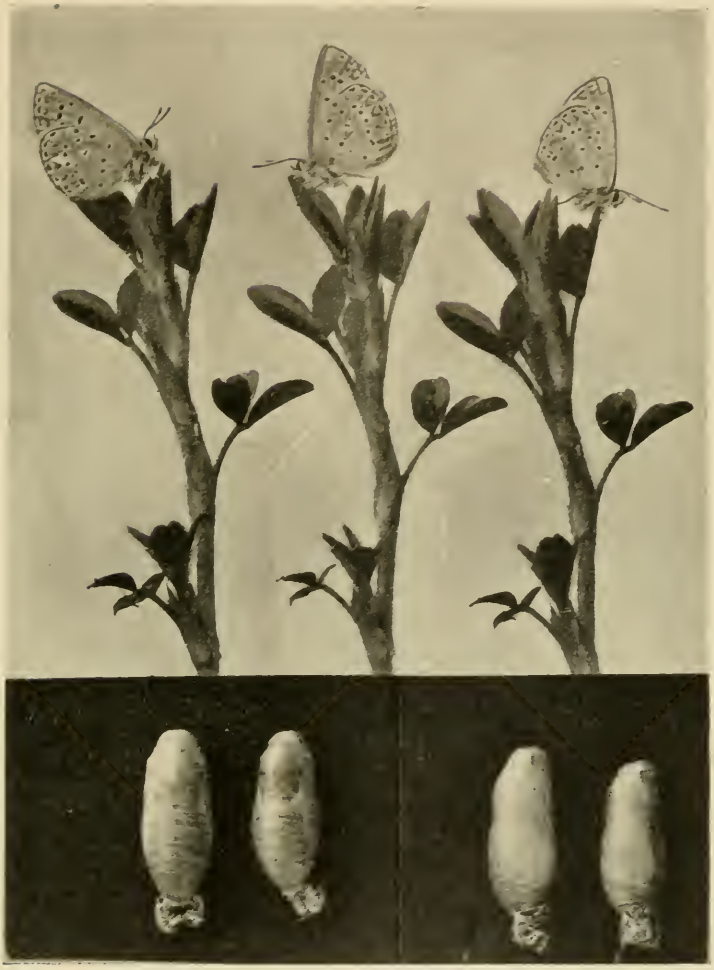
Photo, H. Main. *C. Hentschel.*

LARVAE OF A. THERSITES. PUPAE OF P. ICARUS AND A. THERSITES.



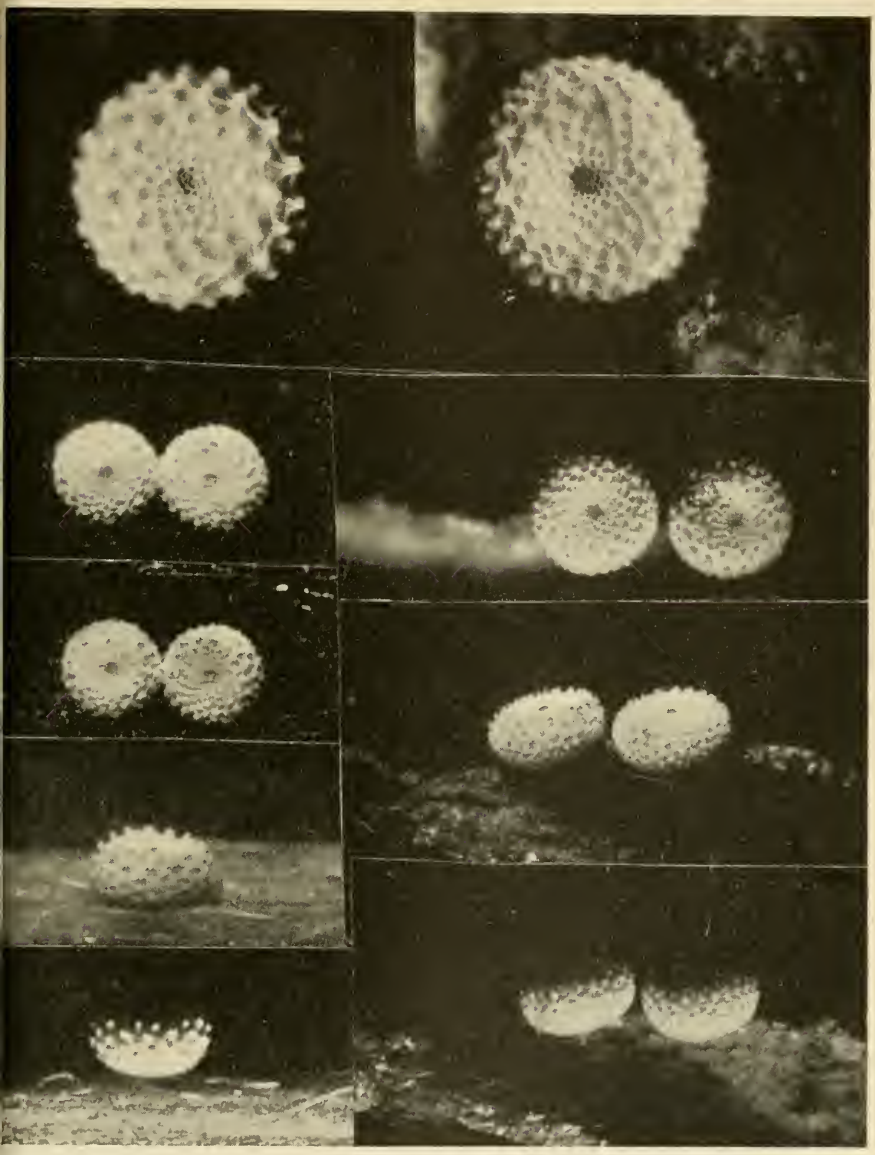
Photo, H. Main. *C. Hentschel.*

LARVAE OF P. ICARUS. PUPAE OF P. ICARUS AND A. THERSITES.



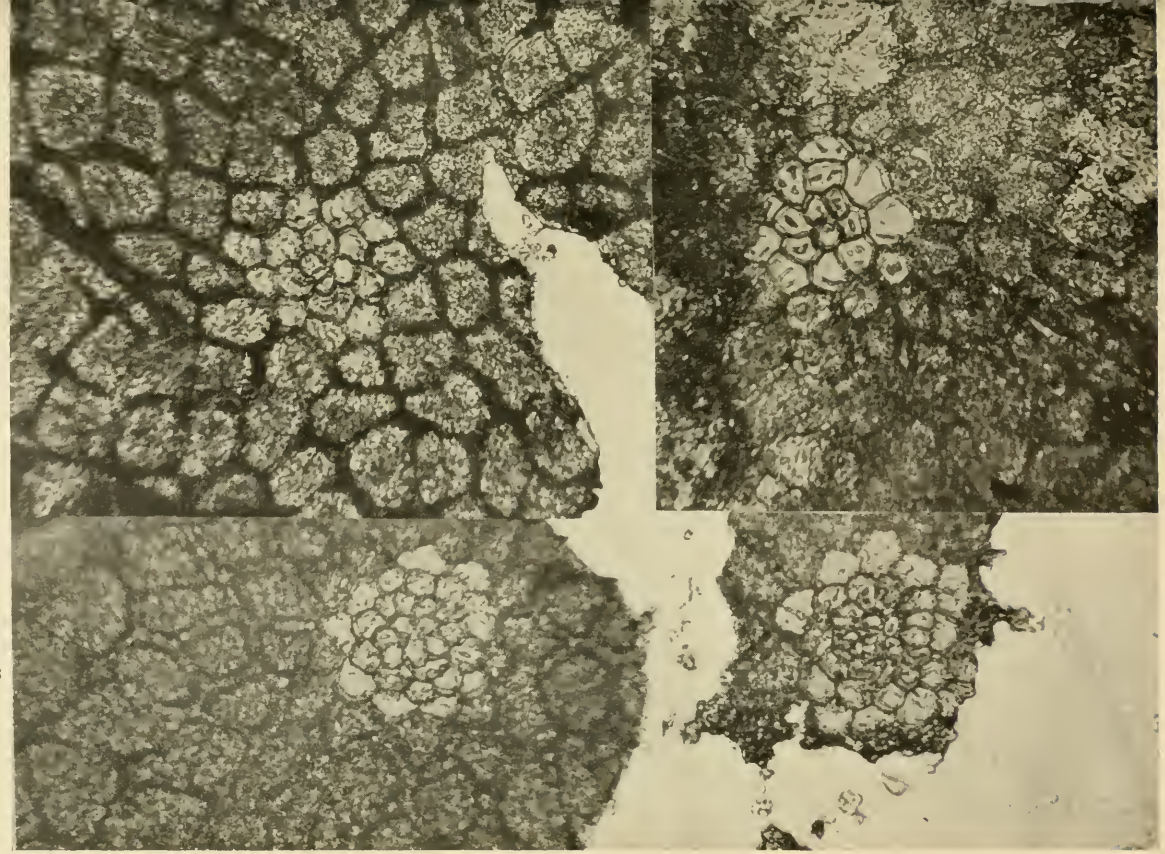
Photo, H. Main. *C. Hentschel.*

A. THERSITES FROM LIFE. PUPAE OF P. ICARUS AND A. THERSITES.



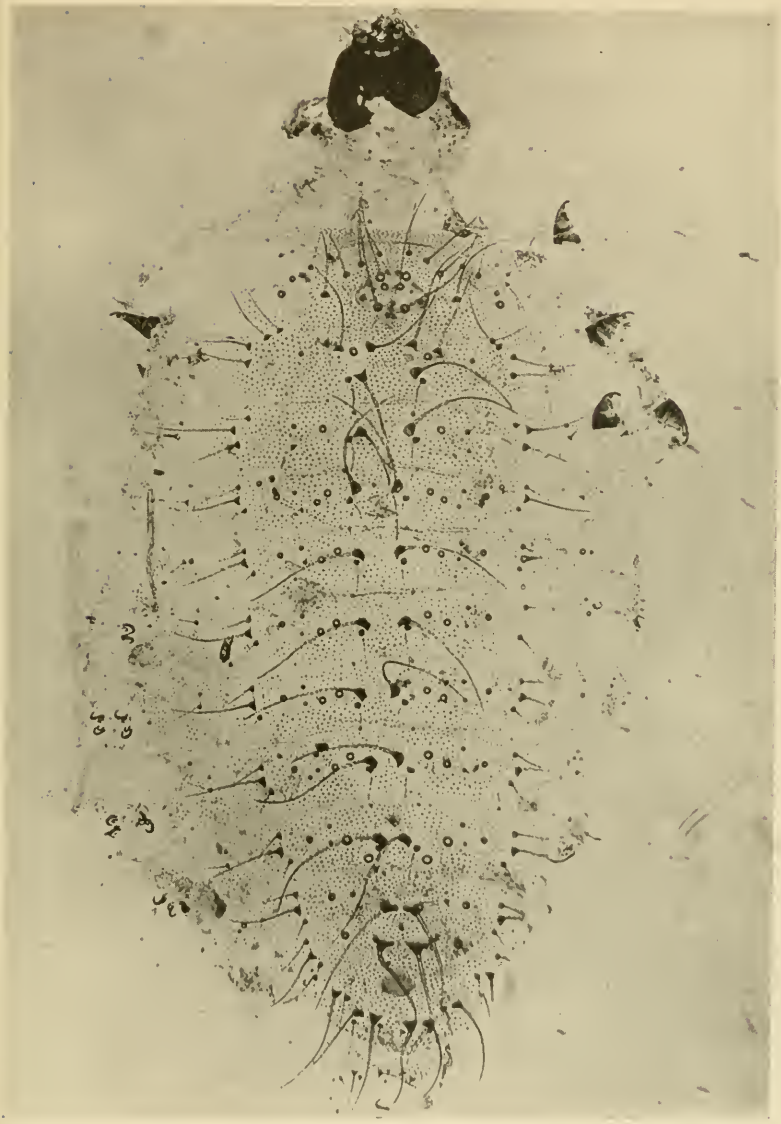
Photo, F. N. Clark. *C. Hentschel.*

EGGS OF A. THERSITES AND P. ICARUS × 60 AND × 30.



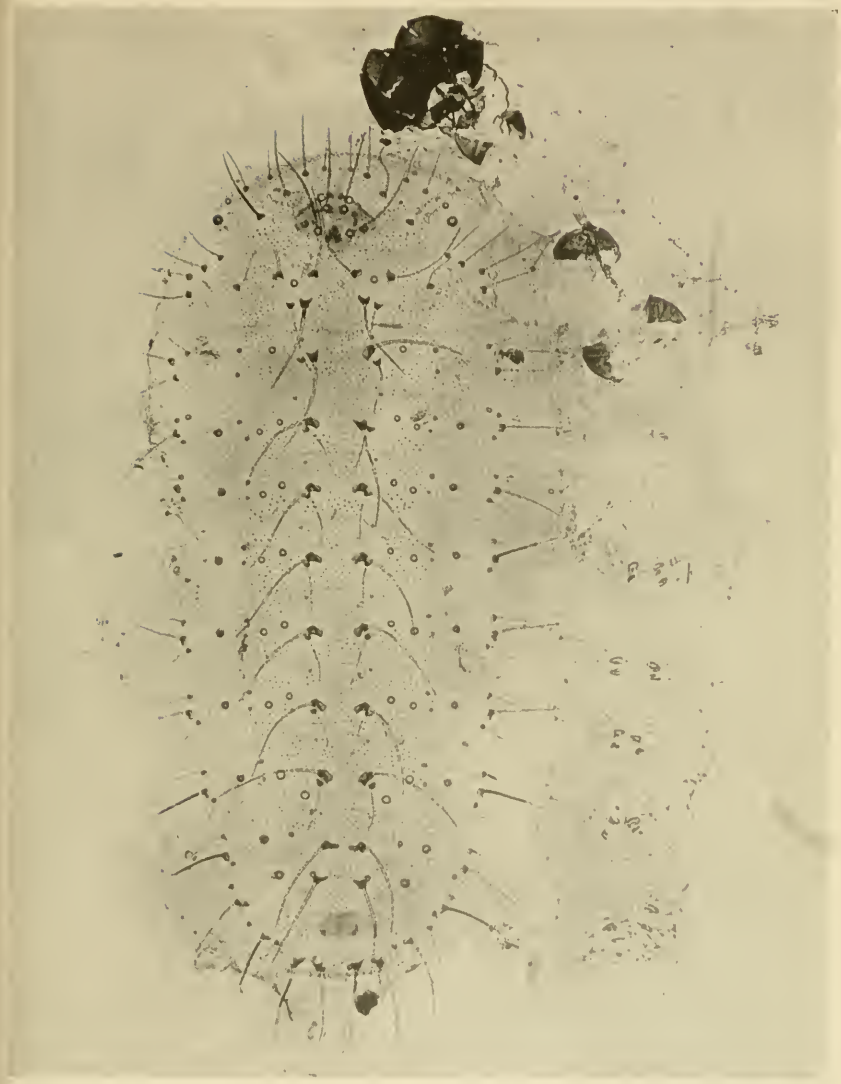
Photo, F. N. Clark. *C. Hentschel.*

MICROPYLES OF EGGS OF A. THERSITES AND P. ICARUS × 350.



Photo, F. N. Clark. *C. Hentschel.*

A. THERSITES, FIRST STAGE × 60.



Photo, F. N. Clark. *C. Hentschel.*

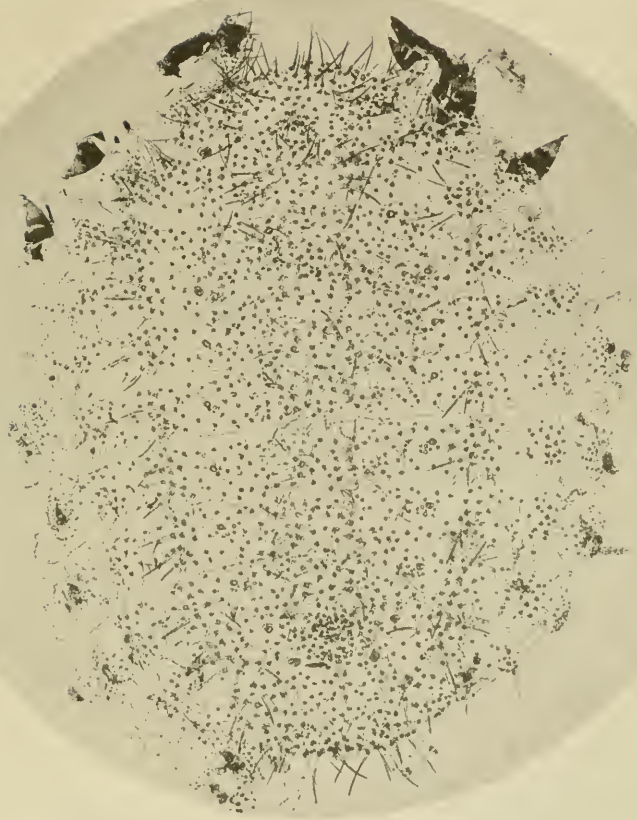
P. ICARUS, FIRST STAGE × 60.

Photo, F. N. Clark. *C. Hentschel.*

A. THERSITES, SECOND STAGE 60.

Photo, F. N. Clark. *C. Hentschel.*

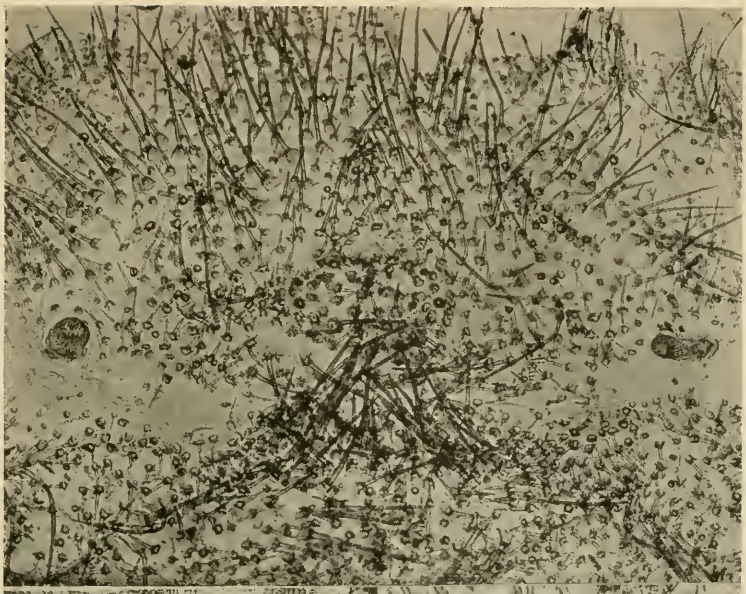
A. THERSITES, THIRD STAGE × 30.



Photo, F. N. Clark. *C. Hentschel.*

A. THERSITES, FOURTH STAGE × 16.

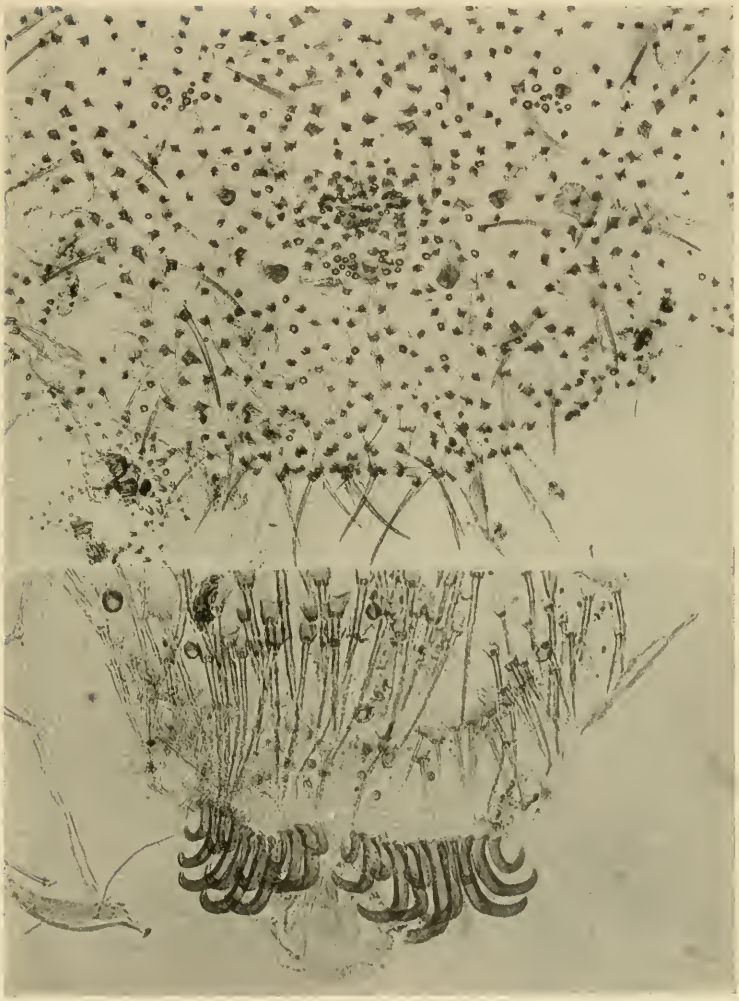
1



2

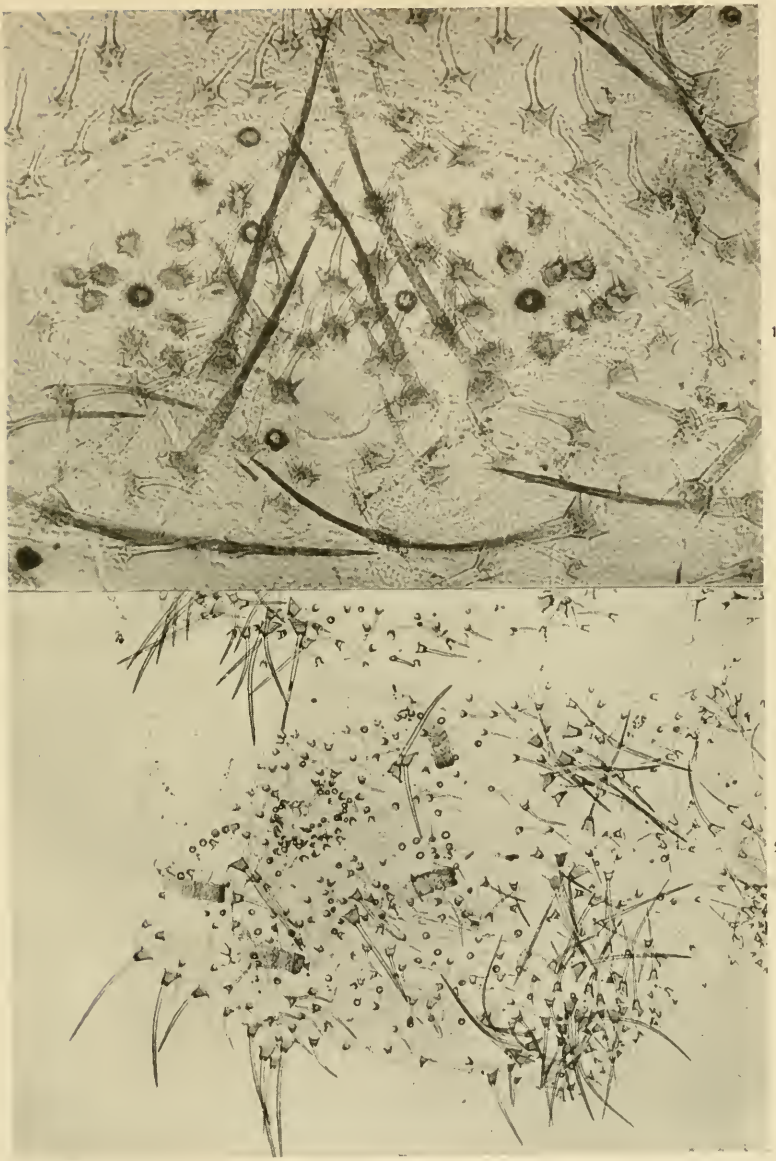
Photo, F. N. Clark. *C. Hentschel.*

LARVA OF A. THERSITES; PROTHORAX.



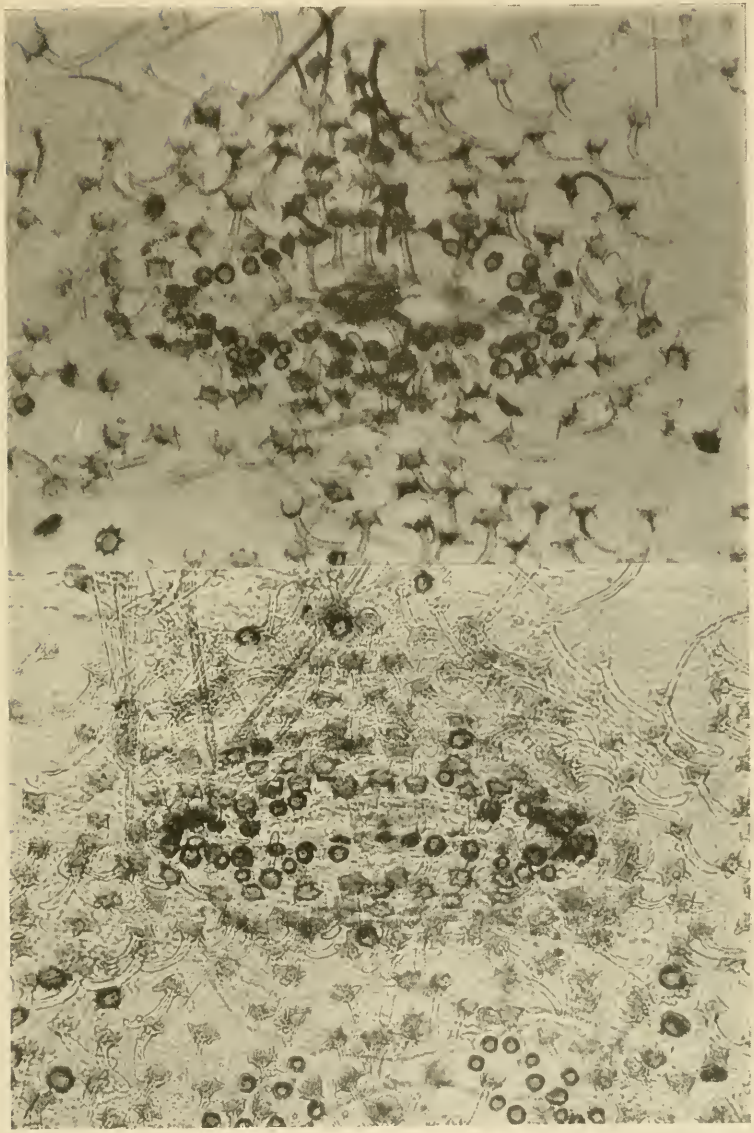
Photo, F. N. Clark. *C. Hentschel.*

LARVA OF A. THERSITES.



Photo, F. N. Clark. *C. Hentschel.*

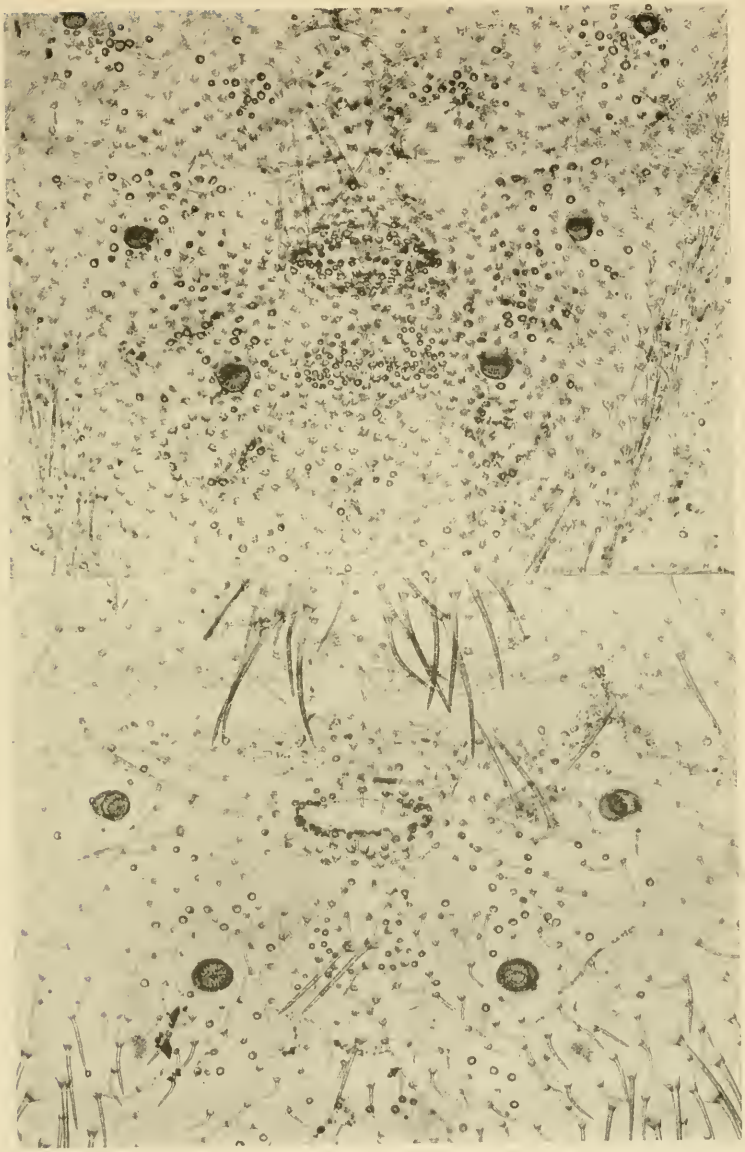
LARVA OF P. ICARUS.



Photo, F. N. Clark. *C. Hentschel.*

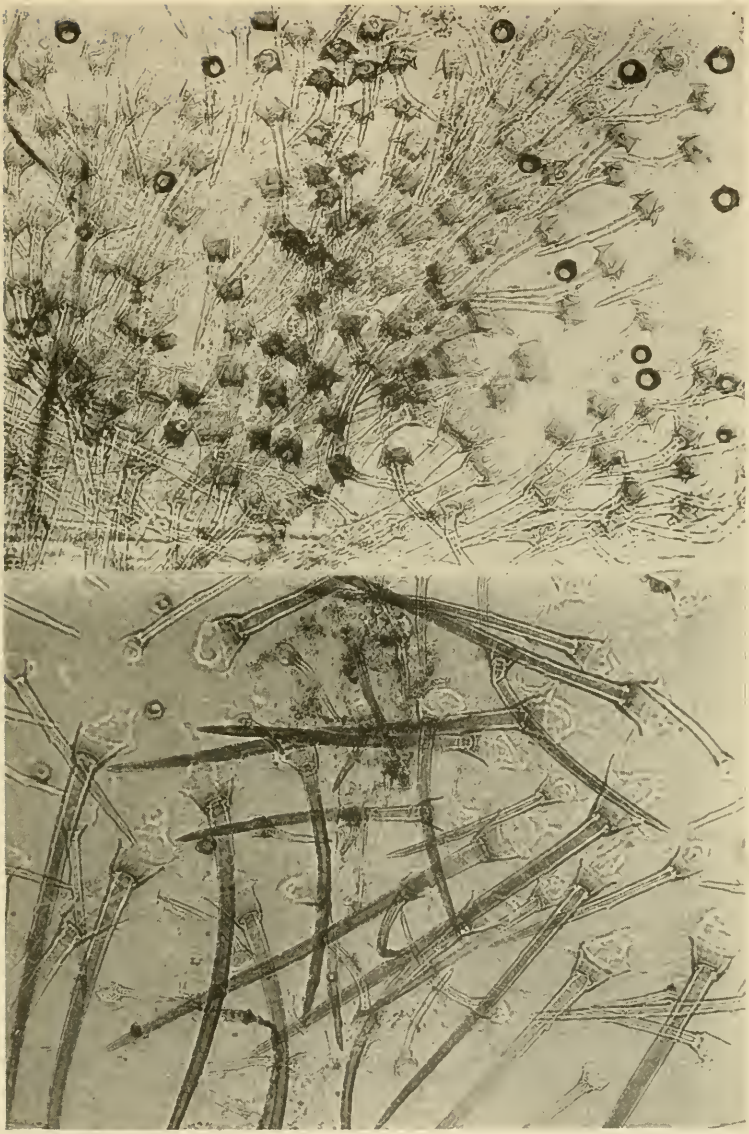
LARVA OF A. THERSITES, HONEY GLAND REGION

100.



Photo, F. N. Clark. *C. Hentschel.*

LAST INSTAR, HONEY GLAND REGIONS OF A. THERSITES AND P. ICARUS FOR COMPARISON × 35.

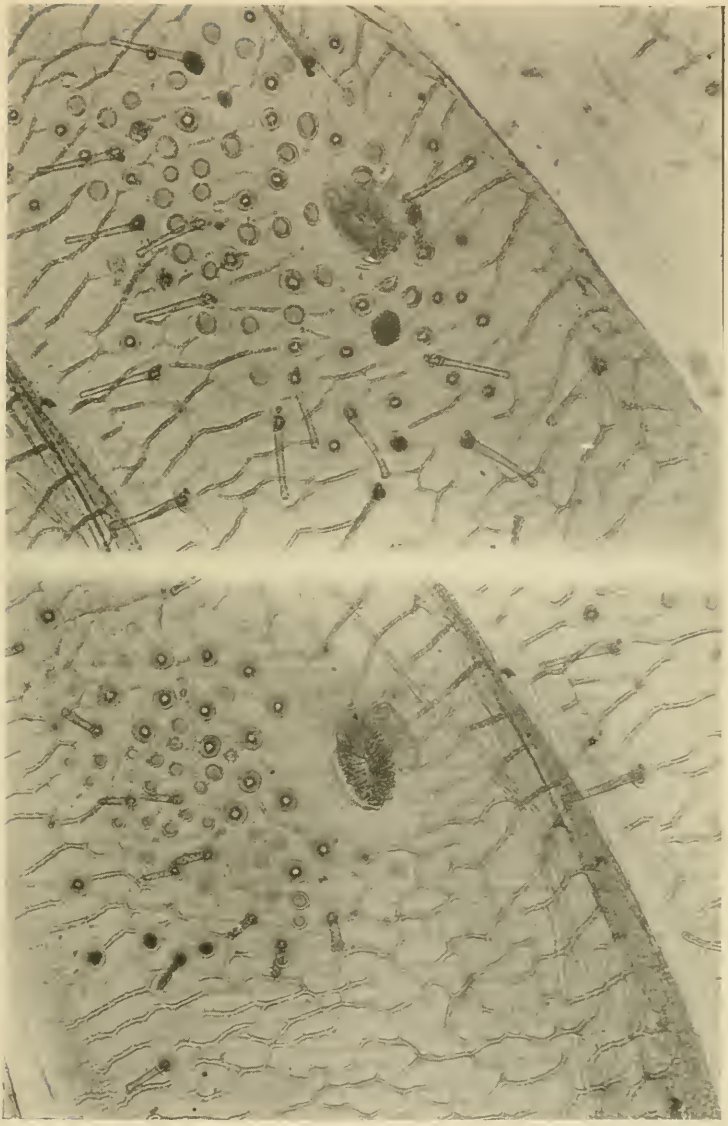


Photo, F. N. Clark. *C. Hentschel.*

DORSAL HAIRS, A. THERSITES AND P. ICARUS × 100.

Photo, A. E. Tonge. *C. Hentschel.*

PUPA OF A. THERSITES.



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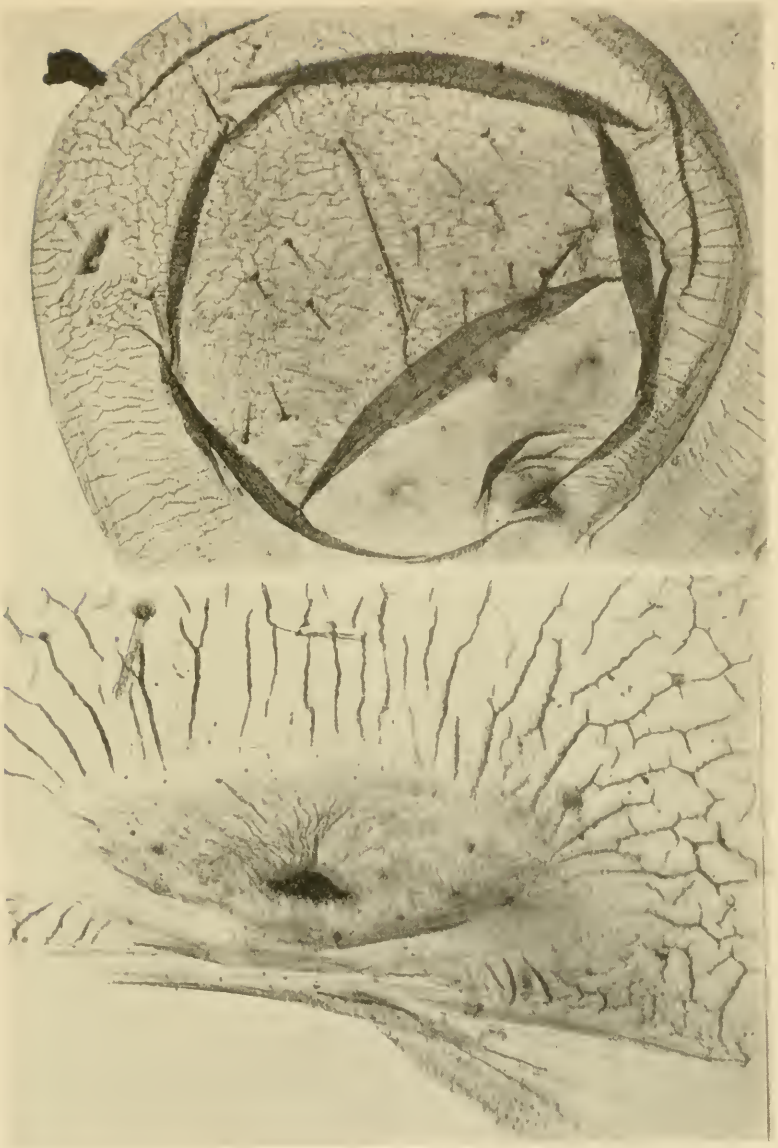
Photo, A. E. Tonge. *C. Hentschel.*

PUPA OF A. THERSITES, SPIRACULAR REGION.



Photo, A. E. Tonge. *C. Hentschel.*

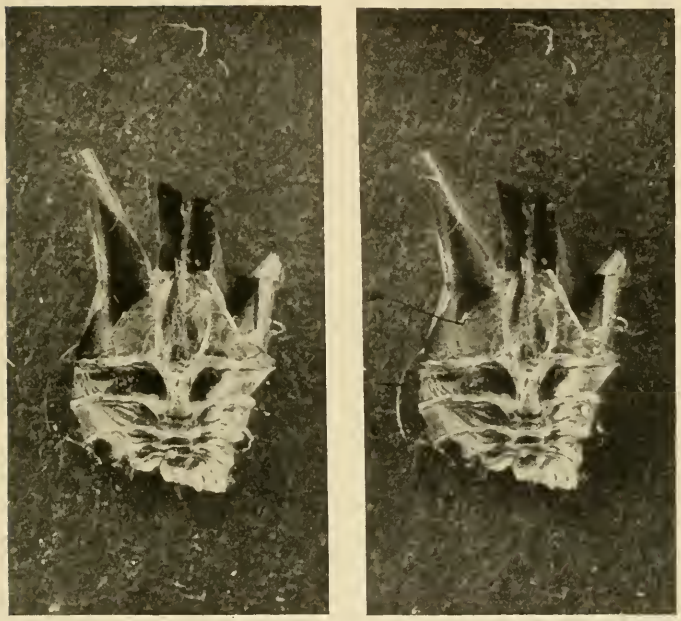
PUPA OF A. THERSITES.

Photo, H. Main. *C. Hentschel.*

FOUR BRED SPECIMENS OF A. THERSITES, TWO P. ICARUS FOR COMPARISON.

Photo, A. E. Tonge. *C. Hentschel.*

"POCKETS" OF PUPAE OF A. THERSITES AND BELLARGUS × 25.



Photo, A. E. Tonge. *C. Hentschel.*

STEREOSCOPIC VIEW OF INNER SURFACE OF PUPA-SKIN TO SHOW "POCKET" × 8.

X. *On a new form of seasonal (and heterogoneutic) dimorphism in* Agriades thersites, *Cant.* By T. A. Chapman, M.D.

[Read March 18th, 1914.]

Plate LIV.

The facts reported in this short communication came to light in my investigations of *Agriades thersites*, and might quite reasonably have found their place in my paper on that insect.

It occurred to me, however, that the few who would care to be informed of these observations, would probably regard my notes on that species as matter rather to be avoided, and possibly *vice versâ*.

In my first paper on *Agriades thersites* communicated to the Society on June 12, 1912, amongst other details by which *A. thersites* might be distinguished from *P. icarus*, I described and figured the androconia (battledore scales) of the two species, as well as those of *A. escheri*, the species to which *thersites*, despite its resemblance to *P. icarus*, seemed to be most nearly allied. This spring, however, I received a letter from Mr. Francis I. Ball, from the Royal Museum of Natural History at Brussels, telling me that he had been examining the Lycaenids in the Museum; he found some South European *A. thersites*, which agreed at all points with my diagnosis of the species, but also some Belgian specimens which did not, but which yet seemed to be *thersites*.

The first point of interest was whether *A. thersites* was a Belgian insect, if so, its range to the North was further than the information I had collected two years ago, pointed to.

The point to which Mr. Ball called most attention, and which interested me greatly, referred to the androconia.

He says " I find two very distinct forms of scale according as I examine the *thersites*-looking insects, or the undoubted *icarus* specimens. The *icarus* scales seem to me to be longer with straighter lateral margins, with the rows of spots much closer together; these rows, too, seem to extend nearer to the proximal end of the scale. In the specimens I take for *thersites* the scales are shorter, the lateral margins more rounded and the rows of spots further apart, and ending further from the proximal end; that is to say, leaving a larger triangular space without spots and giving the whole scale a much more transparent facies than in *icarus*. All this agrees well with your figures and description, but I have not been able to find that the general number of rows for *thersites* is 4 or 5, though for *icarus* it is certainly 5 or 6. It may be from a difference in the part of the wing from which I have taken the scales or from a difference in the race of *thersites* here, or perhaps even they are not *thersites* at all; but I find a large number of scales with 6 or 7 rows, almost identical with what I find in *escheri*."

Mr. Ball sent me certain specimens for examination; they were undoubtedly *thersites* in every respect except these *escheri*-like androconia.

There was also the habitat, which was further North than I had supposed *thersites* to inhabit.

This extended Northern range led me to suppose that in Belgium the species must be single-brooded (monogeneutic). I had already at Le Lautaret (7000 ft.) found a single-brooded race of *A. thersites* in a locality that extended its range in elevation to an equivalent to a northern latitude perhaps even greater than that of Belgium. It occurred to me to examine some of my Lautaret specimens, and I was at once pleased and puzzled to find that they possessed the same *escheri*-like androconia that Mr. Ball described. Examples captured and flying at practically the same date at Bourg d'Oisans, down the valley only some 20 miles from Lautaret, had what I held to be typical *A. thersites* androconia.

Had we then two species, flying so nearly together, and undistinguishable except by the androconia? Though this seemed rather absurd, still, in view of the closeness of *A. thersites* to *P. icarus*, it could not be dismissed as impossible.

It then occurred to me that at *Le Lautaret* I had, for some reason, regarded the brood there as corresponding to

the first or spring brood of *A. thersites*, although it appeared at much the same date as the second brood lower down. All the specimens of which I had previously examined the androconia belonged to the summer brood; I had in fact few specimens of the spring brood (*i. e.* the one that passes the winter as a larva), however, I had some, and, on examining the androconia of one of these, they proved to be of the *escheri* form of the Belgian and Le Lautaret examples. This made definite and exact my somewhat hazy and imaginative idea that the monogeneutic race corresponded to the spring brood of this digeneutic one.

This result is remarkable in several aspects. I am not aware of any obvious difference between the specimens of the two broods of *A. thersites*. The spring brood is usually smaller, but not markedly so, except in occasional examples, and the summer brood is often small. Yet we have, between the two broods, in this difference in the androconia, a difference that is probably of a more profound character than any colour difference of the wing surface, and yet it seems to be the only difference between the broods.

Another aspect is that these androconia have always been held to be very constant characters, but slightly variable in any species, and therefore trustworthy as marking differences between species. It is, of course, highly probable that many of those who have examined these scales have been satisfied with examining one or two examples of a species, and therefore conclusions, however commonly accepted, are not very trustworthy if founded on so narrow a basis.

It is also of much interest to find that this new, but probably really much older form of scale so closely resembles those of *A. escheri*, to which species *A. thersites* is more closely allied than to any other, and that neither form of scale associates itself in any way with those of *P. icarus*.

In this connection it may be observed that *A. escheri* is essentially single-brooded. I do not know any place where it is double-brooded, so far as my observation goes, or so far as I can gather from records, though it just possibly is so in some southern localities.* Assuming the

* Mr. H. Powell tells me he believes it is single-brooded along the Riviera, and so far as he knows everywhere.

first-brood (spring emergence) and the single-brooded form of *A. thersites* to be most nearly related to *A. escheri*, *i. e.* having with it a not very remote common ancestor, it follows that the second (summer) brood is of more modern evolution. Whether in this brood the androconia are following the general facies in approaching *P. icarus*, involves discussion for which data are too scanty.

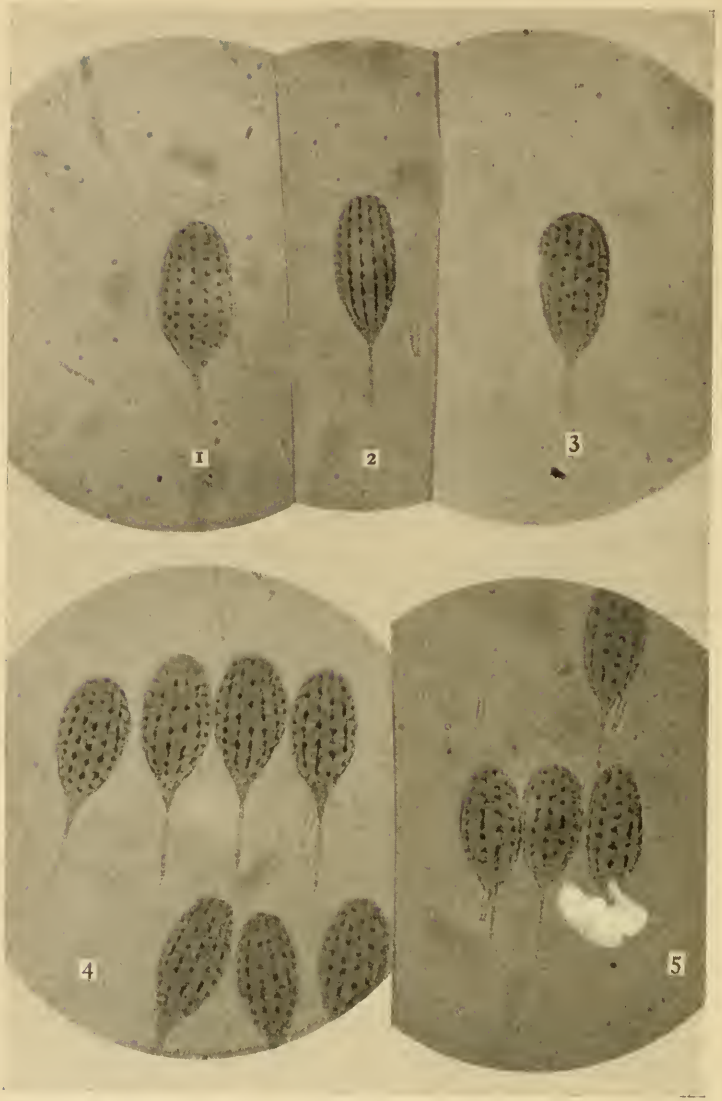
The identity in the genitalia and again in these androconia of the first brood and especially of the single brood of *A. thersites* with those of *A. escheri* suggests strongly, if it does not prove, that *A. thersites* and *A. escheri* have a common origin and are nearly related, and, on the other hand, that the close resemblance between *A. thersites* and *P. icarus* is superficial and of the nature of convergence, due perhaps as much to actual mimicry as to other circumstances such as habits and habitat.

I have examined a few specimens of *P. icarus* and of *A. coridon* and *A. thetis*, in search of a similar seasonal dimorphism in the androconia. It is certain that if there be any such dimorphism, it is not abundantly obvious as in the case of *A. thersites*, and would require a much larger number of observations than I have made to establish; at the same time there is a certain amount of variation that may be individual, but sufficient to prevent my asserting that no such dimorphism exists, though I am almost inclined to assert that there is no trace of it in *P. icarus*.

To sum up, *A. thersites* has so close a resemblance to *P. icarus* that for 50 or 60 years no one has chosen to question their identity, yet *A. thersites* has genitalia in both sexes identical with those of *A. escheri* except in size, and very different from those of *P. icarus*; it has also androconia practically identical with those of *A. escheri*, this is true only of first-brood (when digeneutic) and single-brood specimens. Second-brood specimens have a very different form of androconium, more like (but still abundantly different from) that of *P. icarus*.

So far as I know this is the first record of seasonal (or other) dimorphism in these battledore scales.

That this more primitive and more typical scale of *thersites* was unknown to me till my attention was called to it by Mr. Ball, is due to the circumstance that the monogeneutic race of *A. thersites* was unknown till I discovered it last summer at Le Lautaret, and that the first-brood specimens are probably much less numerous than those of the summer,



Photo, F. N. Clark. *C. Hentschel.*

ANDROCONIA OF A. THERSITES × 500.

but at any rate are very decidedly so in collections and especially amongst my material.

The figures of the androconia of *A. thersites*, *A. escheri* and *P. icarus* on Plates LXXXII, etc., in the Transactions for 1912 may be referred to.

Explanation of Plate LIV.

Androconia of *A. thersites* × 500.

Fig. 1. First (spring emergence) brood from a Digne specimen.

„ 2. and 3. Single-brooded specimens; 2 from Lautaret, 3 from Belgium.

„ 4. Bred 1914. These are either "first" brood or single-brood specimens.

These four figures present a close resemblance to *escheri* (see Trans. Ent. Soc. 1912, Pl. LXXXV, fig. 1). It may be noted that Fig. 2 from Lautaret happens to have been selected as a rather narrow specimen; it has, however, five (and part of a sixth) rows of dots, others on the same specimen would compare closely with Figs. 1 or 4. These four figures are to be compared with Fig. 5, examples from Bourg d'Oisans (1913), or similar specimens figured Trans. Ent. Soc. 1912, Pl. LXXXII and LXXXIII upper figures, showing the form of the androconia of *A. thersites* in the second brood.

XI. *Notes on the Taxonomic value of Genital Armature in* Lepidoptera.

By G. T. Bethune-Baker, F.L.S., F.Z.S.

[Read May 6th, 1914.]

Plates LV–LXV

In that valuable contribution to our knowledge of these organs in Coleoptera by Dr. Sharp and Mr. Muir (Trans. Ent. Soc., 1912, pp. 477 *et seq.*) the following sentence occurs on page 613 :—

" It has been supposed that the copulatory structures are bad guides in classification, although they are generally admitted to be of the first importance for the discrimination of species. If, however, the extreme importance of the genital conduit be seized, it will appear that its structure must certainly be of very great assistance in taxonomy."

Inasmuch as these organs in *Lepidoptera* are not altogether similar to those in the group that were being dealt with in that able memoir, I would substitute for " genital conduit " " sexual armature," and then I would adopt the whole paragraph for my own purpose. I am led to do this for two reasons, the first because there are still eminent systematists among us who for all practical purposes have no belief in the value of these organs, whilst the second reason is that extended investigation of these structures in *Lepidoptera* has convinced me that they are of very great value in taxonomy as well as in phylogeny. Of recent years my researches have gone much further afield than five-and-twenty years ago when I first began this branch of work, and the more I have seen the more do I feel the value of them for the systematist from every point of view. It appears to me that they are necessary characters not only in the discrimination of species but of genera also; I do not say that they are infallible in every genus—there may be, indeed we should expect there would be, exceptions. We consider neuration to be—shall I say—absolutely necessary for correct generic classification, yet there are genera where it is quite unstable, but that fact does not at all impinge on the value of that character for general

classificatory purposes, so it is with the sexual armature of *Lepidoptera*, and my desire is, in this paper, to lay before my fellow systematists, at least those of them who are sceptics on this point, some facts illustrated by figures to enable them to see that there is very much more value to be found in these organs than they have hitherto been willing to admit.

I will begin my evidence with that group of the *Rhopalocera* that I have made my special study—the *Ruralidae*, *i. e.* the *Lycaenidae*, Auct., but it will of course be necessary to consider other families as well. I will first compare *Plebeius argus*, L., and *Polyommatus icarus*, Roth.; if the figures are compared it will be seen that the clasps, Pl. LV, fig. 1, of *argus* are much broader than those of *icarus*, Pl. LV, fig. 2; that the aedoeagus, Pl. LV, fig. 1, of *argus* is much larger (especially longer) than that of *icarus* and is quite a different shape, and that the laterals of the tegumen in *argus*, Pl. LV, fig. 1, are decidedly slighter than those of *icarus*, Pl. LV, fig. 2. Now these are not specific variations; there is a considerable section of Staudinger's " omnibus genus " *Lycaena* that follows the general " build " or form of the armature of *argus*, and there is another considerable section that follows the general build of *icarus*.

The question then arose, Is there any other character confirming their separation, inasmuch as the neuration is practically the same? This character is forthcoming, the eyes of the *argus* group, *i.e.* the genus *Plebeius*, are glabrous, whilst the eyes of the *icarus* group, *i. e.* the genus *Polyommatus*, are hairy. I am aware that certain workers, even of my personal friends, would disregard this character, but I cannot follow them; the character persists in each genus and it does not seem to me to be reasonable to ignore it, especially when it is a confirming point. Over twenty years ago in these Transactions (1892, p. 27) I was induced by these characters to remove *tengstroemi* and its allies from that same " omnibus genus " *Lycaena* to another almost equally " omnibus " genus *Thecla*, since when de Nicéville has created another genus for that little group, viz. *Neolycaena*, naming for its type *sinenis*, Alph. Staudinger and I think nearly all others have accepted the transference without a question.

The genus *Habrodias* was created by Scudder in 1876 (Bull. Buff. Soc., iii, p. 136) for *grunus*. The male armature was not taken into considerat on, the neu-

ration differs from its near allies, whilst the genitalia abundantly justify its separation, the sternite and the tergite sections being very unusual in structure (for *Ruralidae*); the clasps are composed of an ovate portion, truncated at the front apex and angled off at the lower part, it is open fore and aft but closed above and below and on each side are the clasps proper, somewhat ham-shaped with the knuckle end bent slightly downwards, both portions are very sparingly supplied with fine bristles. The aedoeagus is very large (this organ is an important item in *generic* differentiation), shortish, for its family, but very wide, tapering somewhat for the basal four-fifths, where it is obtusely angled, from whence the apex expands into a large florescent trumpet-shaped orifice. The girdle is erect, expanding suddenly forwards below the tegumen, which is funnel-shaped, deeply excavated in front with the dorsum terminating in a blunt point. Whilst the lower part is bifid also terminating in blunt points, below these are the falces broad and strong, suddenly curved upwards near their tips with one or two sharp teeth near the bend; the apices of the lower part of the tegumen are furnished plentifully with bristles, but the dorsum very sparingly. The genus *Hypaurotis* was separated off—again by Scudder (*l.c.*, p. 112)—on what I thought were very fine grounds for the species *Chrysalus*, but having examined the armature I do not think copulation would be likely to take place with species even within its own family. The clasps are quite different in shape to any other American species or any near ally, and the aedoeagus is very peculiar; it is bottle-shaped in its tubular section, tapering wider up to its terminal third, where it is suddenly constricted like the neck of a wine bottle, expanding but slightly at its apex—about as much proportionately as a champagne cork does. The tegumen, however (again a very important generic character), is perhaps the most specialised, the dorsum is broad and ample, the front apex being very highly excavated, the two laterals being reduced to two long deeply curved strong hooks, the front edge below the hooks being deeply excavated also and produced downwards into a lobe at the bottom of which the falces are attached and are very unusual, they are strongly curved upwards from the base where they are very broad and strong, their upper or dorsal part being broadly covered with strong sharp teeth extending along up to the point where they are sharply

recurved, this recurving being much finer and tapering downwards to the apex. The girdle is bent forwards, not erect, and has a broad lobe directly behind the lobed portion of the tegumen.

Two other allied genera *Ialmenus* and *Pseudalmenus* are very close to each other, but their separation is quite justified by the armature; in the former, *Ialmenus evagorus*, the tegumen is hood-shaped and all in front; in the latter, *Pseudalmenus myrsilus*, it is very largely truncated in front with a considerable backward projection, whilst the clasps are formed absolutely diversely in their whole character. On this latter point it should always be borne in mind that clasps may differ and show merely specific differences, but a total change in form and outline, whilst of secondary taxonomic importance to the tegumen, yet has a real value when taken with other details.

In the *Gerydinae* the male armature at once shows marked generic differentiation. In this group is found a complete inversion of the usual characters. In *Gerydus leos* and all other species of the genus the clasps are relatively quite insignificant, not that this has been developed so much by a reduction in size of these organs (though in comparison with other families they are rather small), but by the immense development of the tegumen; this section of the armature is very unusual, the dorsal bridge is reduced to an extremely narrow ridge, whilst the two lateral cheeks or lobes are produced and enlarged into two long razor-shaped blades that when withdrawn into the abdomen occupy more than two-thirds of the abdominal length; the falces or hooks are placed beyond the middle of the blades rather nearer the apex, they are long and strong with a sharp robust S hook at their extremity, their action is secured by a strong chitinous muscular attachment with the front apex of the blade which is specially strengthened for this purpose. The aedoeagus is a short plain tube, tapering to a fine point, the orifice extending backwards for nearly half its length and partaking of the taper already referred to, the clasps are small and shortish somewhat boat-shaped tapering to a blunt point, with the upper apical edge densely fringed with long hairs for nearly half its length, with a patch of hairs on its lower part also. The internal area of the blades of the tegumen is likewise clothed thickly with soft hairs. The African genus *Megalopalpus* belongs to this family and not to the

Lipteninae with which it has generally been placed. The armature proved this conclusively. The same great development of the tegumen has taken place, though in this genus the tegumen is wedge-shaped with the lower fore edges well excavated and curved, thus ending in fine points; the falces are quite different, being of the usual Ruralid shape. Both the aedoeagus and the clasps differ from *Gerydus* though they are of equally simple form, both are, however, rather longer, though slighter. It is quite evident, however, that the genus belongs to the subfamily *Gerydinae*. Let me take another section of the same great order, and let us consider one or two examples from among the *Lipteninae*. The genus *Pentila* needs a good deal of revision; I will take two species out of that genus as it stands in "Rhopalocera Aethiopica," viz. *muhata* and *abraxas*, Hew. In many respects the armature of the former reminds me of that of the *Hepialidae*; it seems to have an additional pair of clasps in the centre of the girdle. As a general rule the tegumen is in the tergite and the clasp in the sternite sections of the abdomen (and we thus have the anal orifice quite distinctly separated from the genital orifice), these being united by the girdle, which in a sense completely amalgamates the tergite and sternite. In *muhata*, however, it would almost appear as if a pair of clasps had been developed at the base of the tergite, as well as in the sternite; to grasp the point fully it is almost necessary to refer to the figure, where it is seen that the tegumen has a slight hood with two long robust arms that are well provided with long strong bristles; below these jointed to the girdle (which in this species is not a simple collar of chitine but is definitely divided near the middle), but still in the tergite, are two broad arms highly excavated at the apex and strongly hooked; they are provided with fine longish bristles. The sternite section of the girdle is attached to the base of the tergite section (Pl. LVIII, fig. 10) and forms quite a distinct section (with the clasps and aedoeagus), though it is jointed on to the tergite portion; the girdle is highly concave and broad developing directly into the two longish clasps with a broadly spatulate apex, the clasps not being separate organs jointed on to the girdle, as is usually the case, they are provided with long fine bristles. The aedoeagus is longish, very broad indeed, of almost equal width, with the orifice the full width of the tube, which is obliquely truncated at the apex; the vesica

is furnished with a central very strong spine surrounded by smaller ones in a bunch of hairs. This species I have taken out of the genus *Pentila* and made the type of the genus *Ornipholidotos*. I have selected *Pentila abraxas* for comparison with it, as it in many respects is nearer than others and is a well-known insect. The tegumen (very different from *O. muhata*) is very ample and broad with a joined apex, which is a very close approximation to the uncus of Gosse, so well known in the genus *Papilio*. It terminates in the shape of a robust horn, well excavated below, from which are developed at the rear two longish heavy lobes, which with the uncus-like extremity are furnished sparingly with fine bristles; the tergite clasps are reduced to two short strong horn-like projections well supplied with strong bristles, whilst the anal orifice opens out on to the surface in a somewhat trumpet-shaped organ. The sternite girdle is expanded backwards and is jointed on to the tergite section, which seems to form an additional covering hood over the organs just described, the sternite portion developing into a broad hollowed long groove below the sternite clasps, and expanding right in front into a heavy clubbed apex furnished plentifully with strong bristles; the clasps form part of the girdle by fusion rather than otherwise and are very broad, terminating in a longish horn strongly bristled. The aedoeagus is very long, of fairly uniform width, very highly curved; the "vas deferens" being highly developed, with the vesica very large and furnished copiously with robust curved teeth, the apical one being extra large and prominent. Here again the alliance of the two insects is evident, but the important parts of the armature from the taxonomic point of view would certainly lead us at once to look for other characters to enable us to separate them, and these we find. *Telipna acraea*—using the genus as is done by Aurivillius—is closely allied to the two species we have just considered in the development of the tergite and sternite sections, see Pl. LIX, fig. 12, but *parva* should come out of the genus. This little species is very interesting, inasmuch as it probably forms the connecting link between the *Pentila* group (in sens. strict.) and the *Liptena* group; this species, as will be seen from the figure, is without the usual form of girdle, it has none in the sternite section, it has its origin in the rear of the upper edge of the clasps with which it is fused, from whence it rises to and fuses with the tegumen, which

is a fairly simple hood excavated on the dorsum with two well-curved cheeks excised on their upper margin, at the rear of which are the robust well-curved falces; the aedoeagus is very close to *O. muhata*, short, very broad, of uniform width, with an obliquely truncated orifice; the clasps are robust, ham-shaped, with the knuckle end moderately long and deeply excised in the middle so as to be like the nose of a pair of hollowed nippers; the two clasps are joined together near the rear by a broad bridge of chitine on the upper edge, and by a narrow strong ridge on the lower margin near the rear also; this unusual method is no doubt necessitated by the fact that the girdle does not exist in the sternite.

The genus *Epitola* is seen to be rightly placed among the *Lipteninae* by the development of the girdle and the tegumen (Pl. LIX, fig. 15), by the general "build" of the clasps and markedly by the aedoeagus; if we compare this latter organ with that of *Pseuderesia tripunctata* the alliance is at once apparent, as also the form of the clasps; the prominent saccus, *i. e.* the extension rearwards at the base of the girdle, is also a somewhat important generic character. The general outline of this genus (*Pseuderesia*) and species is rather beautiful in the bold even curve of the girdle, with its broad fine lateral curtains, each fusing so neatly into the long elegant tegumen. The tegumen shows its Ruralid root in the short strong falces at the base of its small cheeks; it will be noticed that the apex of the tegumen is evenly excised to a slight extent. The girdle in this genus seems to be peculiarly strongly developed; there is an inner girdle (so to speak) consisting of a hollowed and specially strengthened "stay" extending upwards from the base to the back of the tegumen, and over this there appears to be stretched a further outer girdle fitting like a glove, fused with the tegumen and developing the delicate lateral curtains already referred to.

I have considered hitherto an ancient family, very large and predominant but not generally speaking very highly specialised, let us now examine a family that is perhaps one of the most recently specialised of groups, viz. the *Nymphalidae*. Take the small but widely-spread genus *Apatura* and the great genus *Charaxes*. If we look at the figure of the former (*Apatura iris*) two points will at once be evident: the form and development of the girdle with its considerable enlargement of the saccus, and also the

peculiar and prominent " uncal " projection of the tegumen with its development of a special tubular anal orifice. These are Nymphalid characteristics. Both these points are better seen in the figure of *Charaxes tiridates*, but I consider they have reached their highest stage of development in that genus, and therefore I refer to *Apatura* as the more typical; it will also be noticed that the clasps are very large. The difference between the two genera is observable at a glance; the long uncus-like tegumen with a similar but smaller formation at the base of the anal orifice, the narrow girdle with its long and narrow saccus, and the large broad and heavy clasps contrast strongly with the short tegumen of *Charaxes*, where the under projection of the anus is longer than the tegumen itself; the girdle with its very copious and long and broadish saccus and its highly receding position, whilst the clasps though large are of quite a different build to those of *Apatura*. In both the genera the aedoeagus is very long, but in *Charaxes* it is unusually long, and we find rising from the clasps a support for it to rest on which is lacking in *Apatura*.

If we compare *Limenitis* with *Neptis* the same Nymphalid characteristics are apparent, and equally good differences between the genera exist. In *Limenitis* the girdle and the tegumen are highly developed, the latter is very long and has two arms, so to speak, as an attachment to the girdle, for in this group they are not wholly fused; the lower extremity of the fore arm is the base of the anus, there being no frontal projection in these cases; the saccus is but poorly represented, whilst the clasps are very large. In *Neptis lucilla* the tegumen has a much fuller and more copious hinder formation, whilst the uncal position is much less prominent; the clasps are different and have a cleft bifid extremity almost reminding one of the *Ruralidae*. The saccus is more prominent, and the girdle is a modified formation of *Limenitis*.

In *Pararge maera* the girdle remains fairly typical and the anus still remains with a separated orifice (this marked separation is, I believe, a vestige of a very primitive character); the tegumen is very copiously developed in the rear, whilst added to the uncal apex are two small but straight spikes, almost after the manner of the *Everidae* only longer and finer but not jointed; the clasps are long and narrow with toothed and finely serrated lower edges. The aedoeagus is very small with two formidable spikes at

its lower front extremity; it is also furnished with rows of short sharp strong teeth.

Pararge hiera bears out entirely these differences, but the aedoeagus and the straight spikes of the tegumen differ in certain particulars, as a glance at the figures will demonstrate.

Aphantopus hyperanthus is thoroughly Nymphaline and shows its alliance to *Pararge* in the tegumen with its long uncus and stout straight falces (spiked hooks in the *Ruralidae*); the falces might possibly have been evolved first in this genus, inasmuch as they form a solid part of the uncus-like extremity of the tegumen, there being no joint as in *Pararge*; the clasps and aedoeagus are quite different in structure, as will be seen easily from the figure.

Epinephele, as shown in *jurtina*, is more advanced than any of those generally placed near it; the uncal extremity of the tegumen is exceedingly long, and the falces (these show it is rightly placed where it is) are also unusually long; the girdle and the very large clasps are of the advanced Nymphaline type; the aedoeagus, however, is of only moderate length. In addition to these there arise from the lower edge of the last tergite two quite peculiar rather long blackish barbs with deeply serrated apices, placed one on each side the girdle. I am at present unable to conjecture what their use can be.

With *Coenonympha* I will close the *Nymphalidae*, having, I hope, proved my point with the genera I have figured, and I might say I have not "selected" these. I have merely taken what I had by me and what had not to my remembrance been figured before. In *Coenonympha* the uncal extremity is even longer, proportionately, than in *Epinephele*; the falces are long and stout, very different from the fine falces of that genus; the girdle is typical of the group, but the clasps are long and narrow and are furnished with long tufts of fine hairs in addition to the ordinary hairiness of the clasps—these have been cleared away in the figure unfortunately.

In *oedippus*, the type of the genus, the uncal extremity is very large and stout, whilst the arched falces follow suit but are jointed on to the tegumen (thus approaching the articulated joints of the *Lycaenidae* only more primitive); the girdle is narrow with a short "saccus," whilst the aedoeagus is a simple tube, waved, of very moderate width and moderate length.

The *Danainae* show strong characters of their own. The genus *Danaus*, if we are to revert to Latreille's original spelling, has *phlexippus* as its type, but it is the least developed of the group in certain particulars. This we might expect from its almost world-wide distribution, and also if in it we have the origin of its family. Its Nymphaline connection is shown in the shape of the girdle and its saccus. *Danaida* has priority over *Danaus* by four years.

In *Tirumala petiverana* the tegumen is but weakly developed, that is to say, that the chitinous structure is thinner and finer than usual; the tegumen is ample and is developed at its front apex into two ears fairly well excised along the dorsal line; the girdle is copious and has a very large and prominent saccus. The aedoeagus is very large, with a sharp and highly curved downwards bend at a third from its tip, whilst at the lower margin of its tapered orifice is a very large strong tooth edged on its inner side by a short series of strong short teeth; the vesica, also large, is likewise armed with teeth and clothed heavily with fine spines; the clasps are large and highly excavated near the lower front apex and produced into a large horn extending downwards. The end segment of the abdomen proper is fairly evenly terminated without teeth or spines, but having the usual fine hairs. If we compare this with *Danaida phlexippus* we at once see strong differences, so that the armature alone at once suggests the need for another genus; the tegumen is more copious and much more developed in its fore lobes or ears as I termed them in the previous case; the girdle is stronger and the saccus changed from a very broad and large sack, to a long moderately wide cylinder; the aedoeagus, however, is totally dissimilar, it is an exceedingly long narrow tube of equal width for its entire tubular portion, and it has no spines or teeth at all, whilst the vesica has no armature at all; the clasps also have lost the formidable curved hook at their lower extremity, but have a long stout horizontal spike at their upper margin, the two spikes (*i. e.* the one on each clasp) being bridged over by a chitinous collar, whilst the whole of the sternite section is covered over by a broad apron (as it were) of chitine. The other Danaine genus I would refer to is *Amauris*. This again, from its armature only, suggests at once the necessity of dividing it off from either of the others; it has alliances to both of the preceding genera, but differs markedly from each.

The tegumen is quite different in some respects, it is much less ample, is divided into two portions, the terminal or uncal position having almost lost the bifid character; this part is developed into a small triangular hood, attached to the rear of the tegumen by a narrow ridge, and incised at its pointed extremity to a very slight extent; the formation of this has quite a different appearance to those just referred to. The girdle is slight with the saccus smaller and shorter than in *Danaida*; the aedoeagus is similar to *Tirumala* but smaller; whilst the clasps are quite solid and broad, more or less oblong, with no excrescences: in some cases they are squarish at the front edge, and in others quite rounded; the interior of the clasps is furnished with an ample supply of long strong hairs, especially at the lower margin—these hairs are present in all to some extent, but in *Amauris* they are quite a special feature. There is another quite peculiar character, the end segment of the abdomen proper is provided with a formidable series of strong sharp spines of moderate length, this feature being absent in the allied genera. It is a character that I have not found in any other of the *Rhopalocera* that I have examined. I must not omit to mention another important point, all these three genera are furnished with, viz. a pair of long brushes that are protruded from directly below the dorsum on each side of the anus. In *Tirumala* and in *Amauris* they are longish and when extended are prominent; in *Danaida* they are very much smaller, each is placed in a fine membranous case, which is turned inside out on the extrusion of the brushes. Aurivillius in Seitz's work adopts the long-overlooked name *Danaida*, and sinks both *Tirumala*, Moore, and *Melinda*, Moore, to it. I quite agree with him in thinking *Melinda* must fall to *Tirumala*, but the male armature made me at once separate *Tirumala* from *Danaida*, and I find this is borne out by the neuration, for in the primaries of Moore's genus veins 7, 8, 9 and 10 are stalked from a common base, whilst in *Danaida* 7, 8 and 9 are stalked, but 10 rises from the cell.

The valves and the peculiarly bent aedoeagus of a large number of the *Pieridae* indicate a relationship, perhaps, with the almost universal valves of the *Papilionidae*, though the organs within these valves are decidedly less complicated as a rule, whilst the entire absence of them (the valves) in some of the older families—*Colias* and *Leptidia*—to name only two, might seem to suggest that

they are not in reality closely allied, but that the more specialised genera (we cannot say dominant, for *Colias* is a decidedly dominant group), which are now so numerous, may have developed along somewhat parallel lines. Under both sets of circumstances and conditions, however, we have characters of great Taxonomic value.

If we now turn to the *Heterocera* we shall find our contention demonstrated yet more. We will go low down and examine that interesting family so long called the *Sesiidae*; the prominent character of the group is that the male armature (it is confined to the male sex) is provided with copious brushes of long hairs, fixed into the organs exactly after the manner of a hair brush except that the bristles are attached individually to the chitinous wall.

In *Trochilium apiforme*, these bristles are confined to the edges of the clasps—instead of being spread evenly over the whole inner surface—and the bristles are different; in *T. apiforme* they are long large spikes, attached directly to the chitine, not on a tubercle, constricted at the attachment, but immediately expanding very shortly and then tapering gradually to a point; they are confined to the front apical edge, and extend in considerable numbers around the fore half of the upper edge of the clasp. Another character of the group (possibly pointing to the persistence of the original type of these organs) is that the armature is practically in two sections, viz. sternite and tergite, the former being angled rearwards, whilst the latter is slightly fused on to the fore extremity of the angled apex; the tegumen thus loses the typical girdle, becoming practically a separate section (forming the anus with its own separate channel), but being just fused as already mentioned with the sternite at the one point only. In this case the tegumen is almost tubular, the apex of the dorsum being well excavated, whilst the cheeks are furnished with the spikes already referred to; below these are two prominent wedge-shaped falces. The clasps are large and broad, and are curtained over at the front apex, leaving only a deeply hollowed circle for the extrusion of the aedoeagus, which is very large; the vas deferens is densely covered with minute teeth, and the vesica furnished apparently with a rosette of the large spikes previously described. The juncture of the clasps with the girdle is very slight, again indicating the primitiveness of the structure.

These organs are very different from *Aegeria*, where we

find the separated anus has apparently disappeared, though the fusion of the tegumen, *i. e.* the tergite section, with the short girdle, viz. the sternite section, remains as in *Trochilium*. *Aegeria doryliformis* has quite a typical armature, and it differs so much from *T. apiformis* that the systematist would at once conclude that it must represent a different genus, and the conclusion would be borne out by further investigation. In addition to the anal orifice just mentioned, the tegumen is quite different in shape; it is deeply bifid on the dorsum, and carries on each side an extraordinary brush; it might quite well be called like —and very like—unto a carpet brush, long and tapering, with long bristles having split spatulate extremities; there is a large cavity in the tegumen within which these brushes can evidently be withdrawn, whilst at the rear of the cavity is a broad hollowed apron of chitine that would completely fit over the aperture and fall on to the front apex of the tegumen; the whole arrangement is most peculiar and wonderful. The clasps are large, wedge-shaped in this species, with the inner surfaces covered with long fine bristles with split extremities; with the exception of the lower hinder portions of the clasps, these bristles cover the whole surface. The fulcrum, in *Rhopalocera* generally only a furcate fine stem, is here developed into a broad copious hollowed support for the aedoeagus, with a fringe of formidable spike-like bristles on the upper edges of each side; this fringe is evidently capable of entire inversion in a forward direction, and might well act as an exciting agent to one or both sexes during mating. I do not know an organ to compare with this at all in other groups; the figures I give will, I hope, enable the reader to understand the action of these unusual developments. The aedoeagus is a long narrow tube very diverse from that of *T. apiforme*. The saccus, an important character, is long and is fused with both the girdle and the clasp, the latter being rather unusual, and these organs are generally distinctly jointed on to the girdle, which is short erect but quite defined.

Paranthrene tineiformis again differs from *Aegeria* in very essential details; the eighth segment as in that genus is provided with great tufts of long hair in both sections of the segment, which arise from two closely tubercled cushions —two in each section. The separated anus in this genus is as marked as in *Trochilium*, though different. The tegumen has a long uncal extremity totally at variance

with the two preceding genera; the lower tubular portion is very simple, the mere tube being entirely visible in the figure (Pl. LXII, fig. 30). The clasps are bluntly ovate with long fine hairs in fair abundance, but quite different from *Aegeria*, being arranged as is generally common to these organs. The aedoeagus is long and thick, with a vesica that is heavily clothed with fine bristles. The girdle is more primitive than in *Aegeria*, whilst the saccus is almost absent.

If we compare *Orenaia* and *Titanio* we still find differences of sufficient importance to at once separate them, with the expectation of their belonging to different genera.

Orenaia has the tegumen—as represented by *rupestralis* and *alpestralis*—with the uncal extremity produced forwards in a long narrow horn, with a second miniature horn below it sharply serrated on its upper edge, the anal tube lying between these two horns; the tergite armature is thus complete, but it is strongly attached by a short girdle to the sternite section, which consists of clasps and aedoeagus, the former being broad, of uniform width, the apical third being densely provided with very long hairs; the aedoeagus is a long tube of even width obtusely angled at a third from the apex; the vesica is almost entirely covered with fine short teeth, which are horizontally placed as it lies at rest, but would of course be at once elevated under excitement. In *Titanio schrankiana* the tegumen becomes (by fusion) almost a part of the girdle, as it does generally in the higher orders, viz. the *Rhopalocera*; the dorsal area (of the tegumen) is broad and long with a distinct dividing line along the centre, though it is not apparently split into two divisions; the front apex being slightly incised in the centre, within the hollow thus made lies a broad horn-like structure serrated at its apex. The clasps are exceedingly broad, broad enough to envelope the whole armature, and furnished with long hairs at the apical end; the aedoeagus is a highly curved broad tube.

It will thus be seen that though the two armatures are closely allied (the insects were put in the same genus until comparatively recently), the great difference in the tegumen would at once lead one to suspect that they belonged to different genera.

The genera *Cossus* and *Duomitus* are very closely allied indeed; the tegumen in general shape and structure is quite similar; it is not tubular, but is divided into two

sections vertically, which are not separated from each other but are attached, the hind section to the short girdle and the fore section to the upper part of the clasps, and to hind section by very similar chitinous arms that hang down almost vertically, through which the anal orifice passes high up just below the dorsal plate. The sternite portions differ, however, in some important characters. The clasps in each genus are curtained over on the fore part of the upper margin. In *Cossus cossus* the fulcrum is replaced by a large organ attached to the base of the clasp and to the juncture of the girdle and tegumen, consisting of two erect broad rounded and shagreened chitinous plates, the lower part of which is produced forwards into two long strong horns, whilst the upper part extends in a sort of chitinous muscular extension and gradually fuses with the clasp, forming a hollow resting-place for the aedoeagus, which is a moderately broad somewhat curved tube of fairly even width expanding slightly towards the orifice.

In *Duomitus leuconota* the curtain of the clasps is in the rear of the upper margin, not in the forepart as in *Cossus*, and it is a fine membranous curtain, not a strongish bridge as in that genus. The organ replacing the fulcrum is a very large recurved outer tube extending well to the rear of the girdle and terminating about a third from the apex of the clasp, the front aperture being the full width of the tube; in this lies the aedoeagus, which is by no means large for the size of the insect; it is ribbed for most of its length, and has a long tapered extremity. From the armature one would surmise that in both these genera we have the persistence of a primitive type of genitalia.

Turning now to the *Psychidae*, inasmuch as the females are apterous to all intents and purposes, we should expect to find that the male armature is modified, and so it is to some extent, but we find nevertheless quite decided differences between the genera. The marked character of the group is the very simple large tegumen forming a simple covering or hood over the greater part of the organs.

In *Psyche viciella*, Schiff., the hood is very large, covering about two-thirds of the segment (this does not come out adequately in the figure), the hind part of the tegumen extending on to the ventral surface; below this is a small ventral plate to which the clasps are attached; these are quite small and primitive, almost finger-shaped, but rather wider at the rear. The aedoeagus is long and curved, with

a very ample vesica, that is provided copiously with fine short bristles. Comparing this with *Scioptera plumistrella* (a fairly close ally) the difference is marked; the tegumen is quite small, equally simple; the ventral plate is strongly bifid; the clasps are small, but by no means so primitive, being incised at the fore extremity into two lobes, something after the manner of the *Plebeidae*; the aedoeagus is much shorter, and much broader; the vesica must be very weakly developed as I cannot trace it in any of my preparations. In *Oreopsyche atra*, L., the tegumen is quite different in shape, being produced forwards along the middle dorsal line; it is almost double the size of *Scioptera*, though not nearly so large as in *Psyche*, being confined practically to the tergite, whilst the sternite is wholly occupied by a very large ventral plate covering the whole sternite and having a long saccus at the rear; within this lie the two clasps something similar to *Scioptera*, but with the upper lobe much produced, whilst the aedoeagus is a small simple tube. In addition to these very marked characters the seventh and eighth segments are clothed with a collar of formidable spines.

Pachytelia unicolor is closely allied to *Oreopsyche* as to the tegumen and ventral plate, but both are very large; the clasps are large also with apices very similar to the lobster's claw, whilst the aedoeagus is unusually large, both long and broad and with a rather extraordinary globular vesica. I would draw attention to the fact that there is no girdle in this group. It will be seen that even here where we might have looked for great modifications the armature gives very valuable Taxonomic guidance. It was necessary, of course, to confirm this by reference to other groups with what we term, somewhat loosely perhaps, apterous females, I therefore referred to *Heterogynis penella*, Hb.

In this family the tegumen is again the strongly developed portion, but here it is more than a mere covering hood; the tegumen is developed as the tegumen, but without the girdle proper, though there is what may be the first sign of it in the narrow ventral collar at the base of the tegumen. It (the tegumen) is well developed laterally and dorsally and has a peculiar uncal process that is strongly hooked, there being one strong short hook at the apex with two shorter ones at the back; the clasps appear to be absent, but I think are not so in reality, but have merely altered

their position, and in this case lie alongside the tegumen, having shifted themselves to an almost vertical position; they are two curved long broad plates and lie along the fore edge of the tegumen somewhat obliquely, forming a continuous collar with each other ventrally. The place of the clasps, however, is occupied by a finely membranous trough which apparently acts as a support for the aedoeagus, which is of an excessively fine membranous character, and were it not for the unusually large and heavily shagreened vesica, might have passed almost unobserved. I hope I have now brought forward sufficient evidence, both among the higher groups of the *Lepidoptera* as well as among the lower genera, to prove that the male armature is generally speaking of as much value in the Taxonomy as in the Phylogeny of the families. I recognise there may be cases where the value should be discounted, as there are cases of neuration where it also is at a discount; generally speaking, however, neuration is one of our most valuable characters, and inasmuch as it is present in both sexes it is a more reliable character than the male armature; but these organs will not infrequently settle a disputed point of generic affinity, as I have shown more than once in these Transactions, and the more deeply I become acquainted with them, the more am I impressed with the fact that they are of the utmost value, not only for differentiation of species but also of genera.

Whilst I am discussing the male armature I am desirous of drawing attention to a few genera of the *Ruralidae* with somewhat abnormal male organs. The smallest species of the group, omitting *Zizula gaika* perhaps, are two African and two American species, *i. e.* should the latter really prove to be distinct from each other. These must, I think, be classed under the same genus. In 1876 (Bull. Buff. Soc. iii, p. 124) Scudder proposed the name *Brephidium* for the American ones, viz. *exilis*, Boisd., and *isophthalma*, H. S. The African insects are *metophis*, Wllgr., and *barberae*, Trimen, which must certainly belong to the same genus as the others or a closely allied one, and as they have hitherto been placed in the "omnibus genera" *Lycaena* or *Cupido* I accept Scudder's name for three out of four. The male armature is on entirely similar lines, the neuration is similar and the superficial facies is likewise similar on the whole. The principal character of the armature is the enormous development of the tegumen, which occupies

two-thirds of the lateral area, and is excised along the dorsum up to the girdle or nearly up to the girdle, the lateral checks being exceedingly large and broad, their fore apex being edged with a cluster or short line of long erect formidable spines, which are carried on a long arm from the rear of the tegumen that encircles the lower and front margin, lying on it so closely as to appear to form an integral part of it; whilst there is another peculiar process in the rear of these, the clasps are pyriform in all species, and the aedoeagus in *metophis* and *exilis* is quite extraordinarily similar, but in *barberae* it differs. In the two former it is bulbous with a small curved tapering extremity at the rear and a straight narrow wedge-shaped tip, below which from near the middle of the bulb a longish narrow horn is developed with its lower apical edge serrated, this extends almost as far in front as the tip itself.

In *barberae* the aedoeagus is so totally different in shape and in most of its details, that it constrained me to think that it must belong to another though very closely allied genus. I therefore looked up its other structural characters and found they confirmed my first impressions; the neuration of the costal area is quite different from *Brephidium*. It certainly needs another genus for its reception, and I propose for *barberae* the name *Oraidium* in contrast with Scudder's name. In *Oraidium barberae* veins 6 and 7 rise from the upper apex of the cell, and 7 is not stalked, 8 and 9 are absent, 11 is bent up to almost or quite touch 12. In *Brephidium* 8 and 9 are stalked, rising from the cell well before the apex, whilst 7 is absent and 11 is a short obsolescent bar anastomosing with 12.

The armature of *Oraidium* differs in that the arms, bearing at their tips the great spines, rise from the lower front angle of the tegumen and are projected straight forward obliquely, not encircling the lateral cheeks; the aedoeagus is saddle-shaped at the rear, descending abruptly from the ridge vertically downwards, and then near the lower edge the tip is produced forwards in a very long and very narrow tube for quite double the length of its saddle portion, whilst from the lower base is projected forwards a similar equally long and yet narrower tube. The alliance of the two genera will be seen in the lower long horn-like processes which are very unusual emanating from the position of these organs. From the smallest Ruralid we will go to the largest, viz. *Liphyra brassolis*, Westw.

The life-history of this extraordinarily specialised insect is now fairly well known, its entire immature life is spent in ants' nests—*Aecophilla virescens*, I believe; its larva is covered with an excessively hard chitinous coat of mail, quite impervious to the attacks of its enemies on whose larvae it feeds, and it pupates absolutely within its chitinous skin, whilst the imago when it emerges, soft and weak, is so enveloped with fugitive scales that the ants smothered with them are entirely baffled thereby. The armature is quite Ruralid but peculiarly developed; its great size will be seen from the figure which is magnified, × 30, as are the other figures. The tegumen is not large for the size of the armature, but it has a quite peculiar hindward process; the tegumen is continued to the rear for two-thirds of its forward length, two longish crescentic arms then descend, which are entirely excavated on their inner side, giving the appearance of a great hooked extension at the back of the girdle, there are the usual falces of the order, large and strong; the girdle is copious but simple, and the clasps are small, ham-shaped, with the knuckle end (*i. e.* the apex) well furnished with strong short teeth; the fulcrum is very strong, rising from two pyramidal bases with a common foundation, and consist of two erect strong straight spikes; the aedoeagus is a large and broadish tube, with the usual basal extension and a large shagreened vesica, which is seen in the figure as apparently part of the apical orifice of the tube.

In the genus *Mimacraea* we might perhaps expect to find, as we do, very specialised armature, the short anal orifice (or very short tube) is apparent practically on the underside of the dorsum, there being no tegumen proper (as to its dorsum at least), the anus taking its place and being fused on to the two lateral lobes or cheeks of the tegumen at their upper rear margin: the lateral part of the tegumen consists of two large spherical lobes (one on each side) whose upper front margin is produced forwards into two long curved horn-like processes, the apices of which have a short row of very fine minute setae. The girdle is narrow and simple in its main support, but is provided with fine lateral curtains from the base of the tegumen to near the fore part of the clasps; this curtain is furnished with strong spines on its lower portion, as also is the inner surface of the clasps; these are of unusual shape, difficult to describe, and are furnished at the ex-

tremity with a stout downward curved hook; the fulcrum is absent doubtless because the very unusual shape of the aedoeagus would render it useless unless it were enormously developed. The aedoeagus is angled sharply near its rather ample base at right angles, where it ascends and in a deep bold curve is then bent over and produced forwards as a long strong tapering horn and terminates in a pointed tip.

The only genus with which I am yet acquainted that has any resemblance in its tegumen to *Mimacraea* is *Arrugia*; in *basuta* the tegumen somewhat approaches the shape of its lateral lobes but is very dissimilar in its other parts; its fore lobes are somewhat like those just described, but the rear portion of the tegumen is normally constructed, being entirely hooded over. In this genus, however, the tergite and sternite have their own organs; beneath the lobes at their inner extremity the falces rise and are two powerful horns deeply curved, whilst directly below them, more or less parallel as to position, are a pair of shorter curved arms edged on the upper margin with short sharp teeth, these form the lower margin of the tergite section. The clasps are large and broad, roughly Plebeid in shape, but without the apical incision; the fulcrum is long straight and oblique; the aedoeagus is a shortish broad tube straight on its upper margin, waved on its lower margin, slightly tapered at its apex, with a finely shagreened vesica; there is a broad collar fixed in the girdle through which it passes; the girdle is very narrow and irregular with fine lateral curtains and with a prominent saccus. It will thus be seen that whilst the armature points to a strong Liptenine origin there is yet something apparent in the clasps and saccus of a Ruraline character.

The American *Fenisca tarquinia*, as also the Eastern *Spalgis epius*, have carnivorous larvae and peculiar facies of their own, both however have Ruralid armature, though developed on lines of their own in some respects.

Fenisca tarquinius, Fab. (Pl. LXV, fig. 46).

This has the tegumen hooded and strongly developed forwards, its front apex having a slight rounded excavation; it has the usual falces; the clasps are subtriangular and are bridged over by a narrow elevated chitinous collar from the apex of the triangle; the front tip is strongly

but very shortly toothed. The aedoeagus is very long, narrowish with the apex finely toothed; the girdle is fairly ample, erect with a very long narrow saccus. It very frequently follows that a very long aedoeagus is accompanied by a very long saccus.

Spalgis epius, Westw. (Pl. LXV, fig. 47).

Here the tegumen is also hooded, but quite differently from *Fenisca*; it forms a distinct hood, being only slightly attached to the girdle at the rear of the dorsum, the development is entirely forwards again; the falces are quite short and broad; the clasps are subovate with constricted and hollowed and toothed fore edges; two strong deeply curved horns drop forwards from near the centre of the clasps which may possibly take the place of the fulcrum, it is, however, an unusual formation; the girdle is fairly erect but curved in the middle, and is without any saccus; the aedoeagus is longish with the tube tapering somewhat smaller for its apical half.

In closing I will compare two genera somewhat widely separated, viz. *Horaga* type *onyx* and *Loxura* type *atymnus*, in order to show a somewhat unusual development in each case, but a development that has gone on along parallel lines, though the genera are not at all closely related. It is not, of course, surprising that this should be so, but it is none the less interesting.

In *Horaga onyx* the tegumen consists of a saddle which is very deeply bifid, the two extremities being hoof shaped; the falces are attached at the back and on to (as it were) the fetlock joint; the girdle is broad, inclined well forwards and has no saccus, whilst the clasps are scymitar shaped, with an abundant supply of long coarse bristles. The aedoeagus is of moderate size, both as to length and width, with the vesica highly developed, being covered with short teeth.

In *Loxura atymnus* the tegumen has the saddle ridge much reduced, whilst the highly bifid extremities are decidedly increased in length, terminating in two finger-like appendages; the falces are long and fine and deeply curved; the girdle is very broad and ample, very much depressed and inclined forwards and over the clasps; the knife-shaped clasps, have the basal half decidedly wider than the fore part, there are no long bristles, but instead the edges of the clasps have a few very short fine

hairs; the aedoeagus is wide at its basal attachment, but the fore half is a simple narrow tube with the vesica scarcely developed at all. It will thus be seen that the clasping and general armature of the two genera has developed along closely similar lines.

Explanation of Plates LV–LXV.

PLATE LV.

No. 1. *Plebeius argus* × 30.
2. *Polyommatus icarus* × 30.
5. *Hypaurotis chrysalus* × 20.
5*a*. *Hypaurotis chrysalus* × 30 (to show the formation of the tegumen and falces and the aedoeagus).

PLATE LVI.

No. 3. *Neolycaena tengstroemi*.
4. *Habrotis grunus*.
6. *Ialmenus evagorus*.
7. *Pseudalmenus myrsilus* (fulcrum accidentally everted).

All magnified × 30.

PLATE LVII.

No. 8. *Gerydos leos* × 30.

PLATE LVIII.

No. 9. *Megalopalpus gigas* × 15.
9*a*. *Megalopalpus gigas* × 15 (to show the wide angle of vertical motion).
10. *Ornipholidotos muhata* × 30.
11. *Pentila abraxas* × 30.

PLATE LIX.

No. 12. *Telipna acraea*.
13. *Liptena parva*.
14. *Pseuderesia tripunctata*.
15. *Epitola posthumus*.

All magnified × 30.

PLATE LX.

No. 16. *Apatura iris* × 10.
17. *Charaxes tiridates* × 6.
18. *Limenitis camilla* × 10.
19. *Neptis lucilla* × 10.
20. *Pararge maera* × 10.
21. *Epinephele jurtina* × 10.

PLATE LXI.

No. 22. *Aphantopus hyperantus* × 10.
23. *Coenonympha oedippus* × 20.
24. *Danaida phlexippus* × 6.
25. *Tirumala petiverana* × 6.
26. *Amauris dannfeldti* × 6.
27. *Amauris angola* × 6.

PLATE LXII.

No. 28. *Trochilium apiformis* × 15.
29. *Aegeria doriliformis* × 30.
30. *Paranthrene tineiformis* × 30.
31. *Orenaia rupestralis* × 30.
32. *Titanio schrankiana* × 30.
33. *Cossus cossus* × 10.
34. *Duomitus leuconota* × 10.

PLATE LXIII.

No. 35. *Psyche viciella* × 30.
36. *Scioptera plumistrella* × 30.
37. *Oreopsyche atra* × 30.
38. *Pachytelia unicolor* × 30.
39. *Heterogynis penella* × 30.
40. *Brephidium exilis* × 30.
41. *Oraidium barberae* × 30.
44. *Mimacraea fulvaria* × 10.

PLATE LXIV.

No. 42. *Liphyra brassolis* × 30

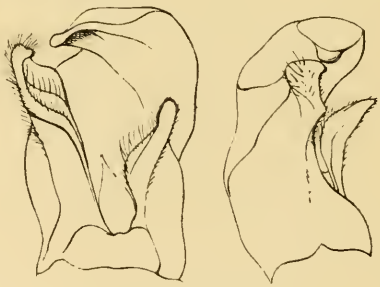
PLATE LXV.

No. 45. *Arrugia basuta* × 20.
46. *Fenisca tarquinnius* × 30.
47. *Spalgis epius* × 30.
48. *Horaga onyx* × 30.
49. *Loxura atymnus* × 30.

Revision of the Mexican and Central American Chauliognathinae (*Fam.* Telephoridae), *based on the genital armature of the males: a correction.* By George Charles Champion, F.Z.S.

Too late for correction in the proper place, a mistake has been detected in the name of one of the species of *Chauliognathus* figured in the "Revision" (*antea*, pp. 128–168), due to the printed label-number, 1665, attached to the separately-mounted preparation having been misread 1655. The dissection (1665) of a dark variety of *C. limbicollis* was thus, by accident, selected for the figure (Plate V, figs. 14, 14*a*) and description (p. 144) of the aedeagus of the male of *C. lecontei*; the corresponding structure of the first-named insect was correctly illustrated on Plate VI, figs. 22, 22*a*. Figures of the aedeagus of *C. lecontei* are appended herewith, and the following description must replace that given on p. 144. As might be expected, the general structure of the organ in question is very similar to that of the allied *C. profundus*, except that the left lateral lobe is very much shorter.

C. lecontei, *Ch.* ♂. Aedeagus: median lobe stout, strongly curved, produced at the apex into a broad, spoon-shaped process; left lateral lobe moderately long, stout, angulate at about the middle, the basal portion broad, the apical portion narrower, spoon-shaped, abruptly hooked at the tip; right lateral lobe much shorter than the left, compressed, obliquely bent outwards from about the middle, the tip somewhat pointed.



C. lecontei, Ch.

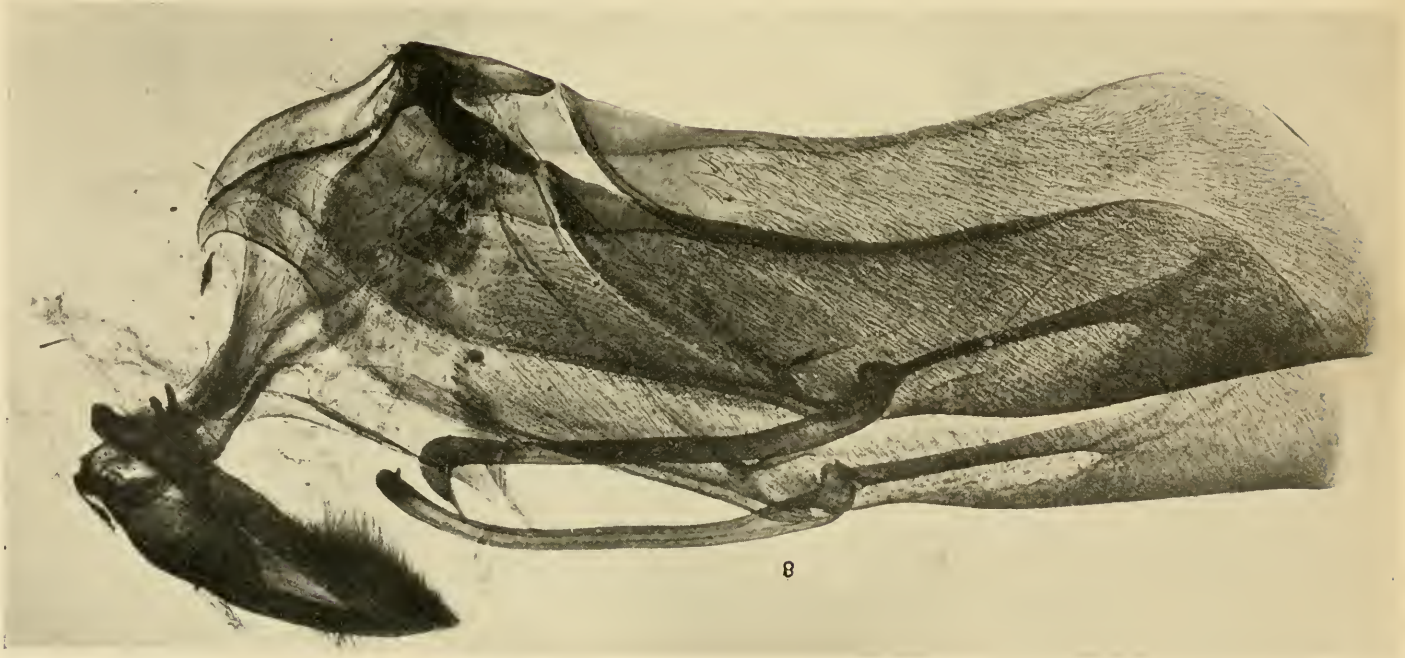
October 8th, 1914.

C. Hentschel.

MALE SEXUAL ORGANS OF SOME RURALIDAE.

C. Hentschel.

MALE SEXUAL ORGANS OF SOME RURALIDAE.

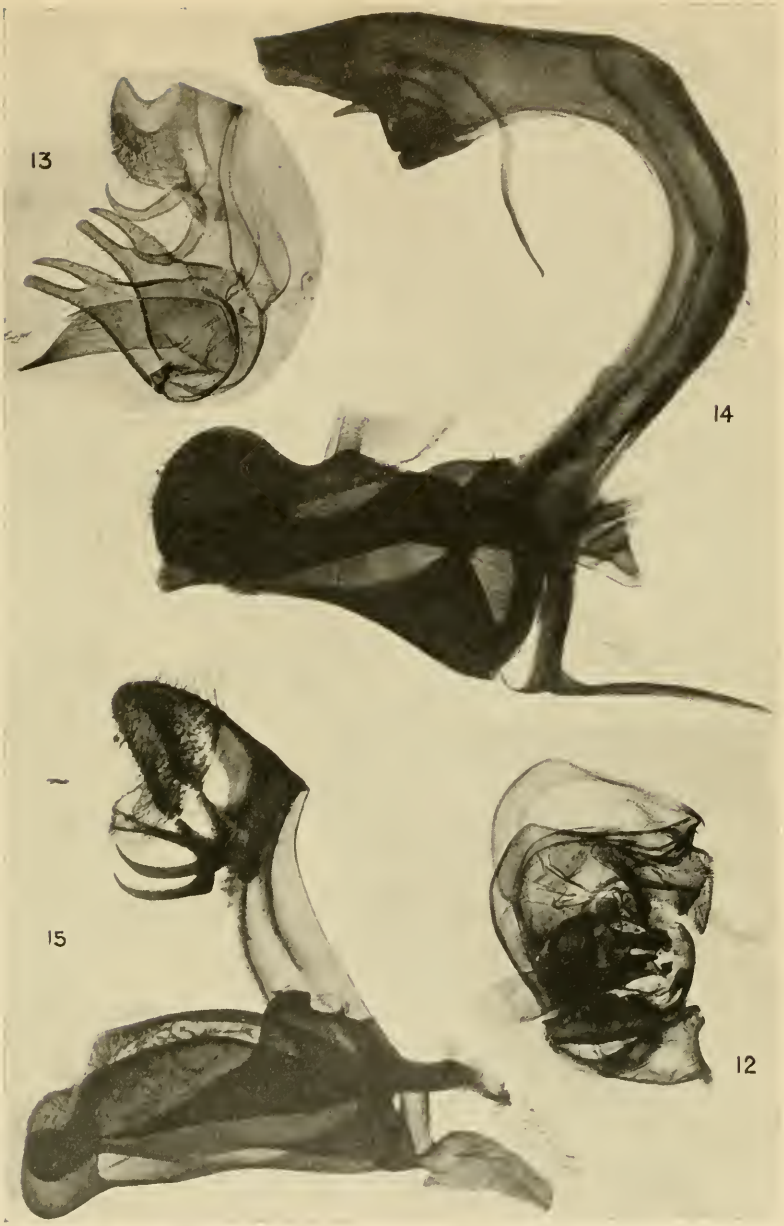


Photo, A. E. Tonge. *C. Hentschel.*

MALE SEXUAL ORGANS OF GERYDUS LEOS.

Photo, A. E. Tonge. *C. Hentschel.*

MALE SEXUAL ORGANS OF LIPTENINAE AND GERYDINAE.



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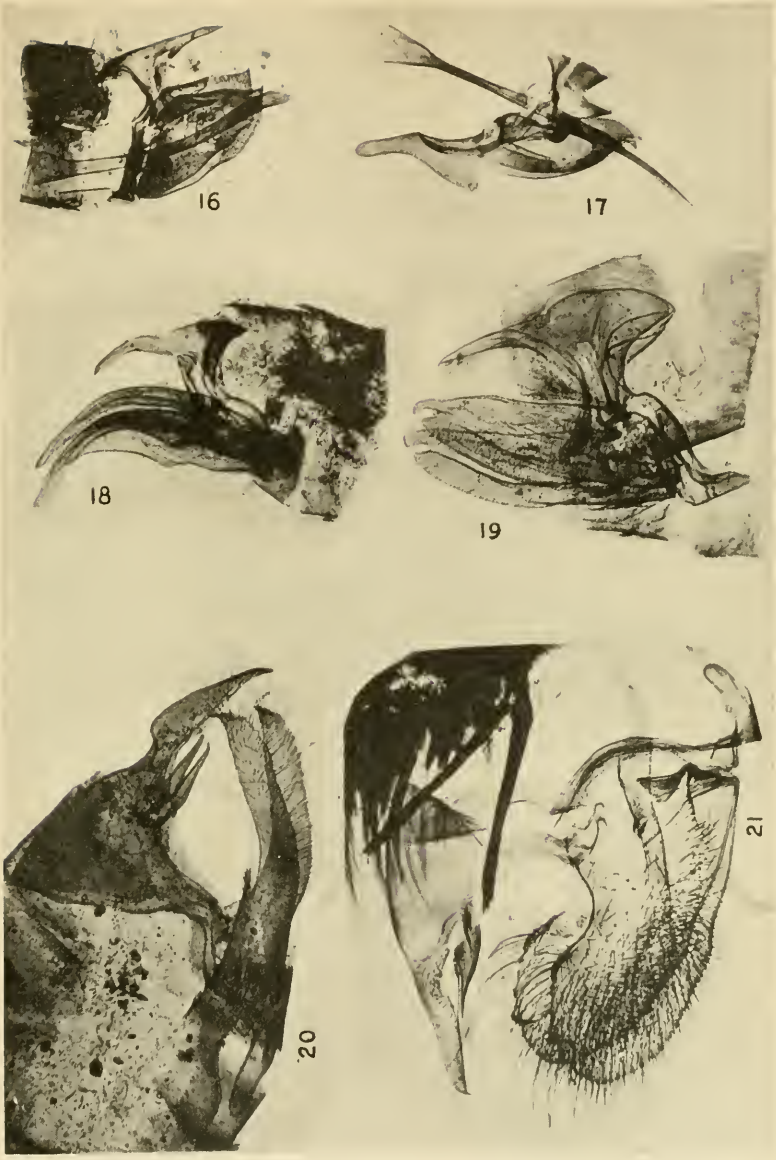
MALE SEXUAL ORGANS OF THE LIPTENINAE.



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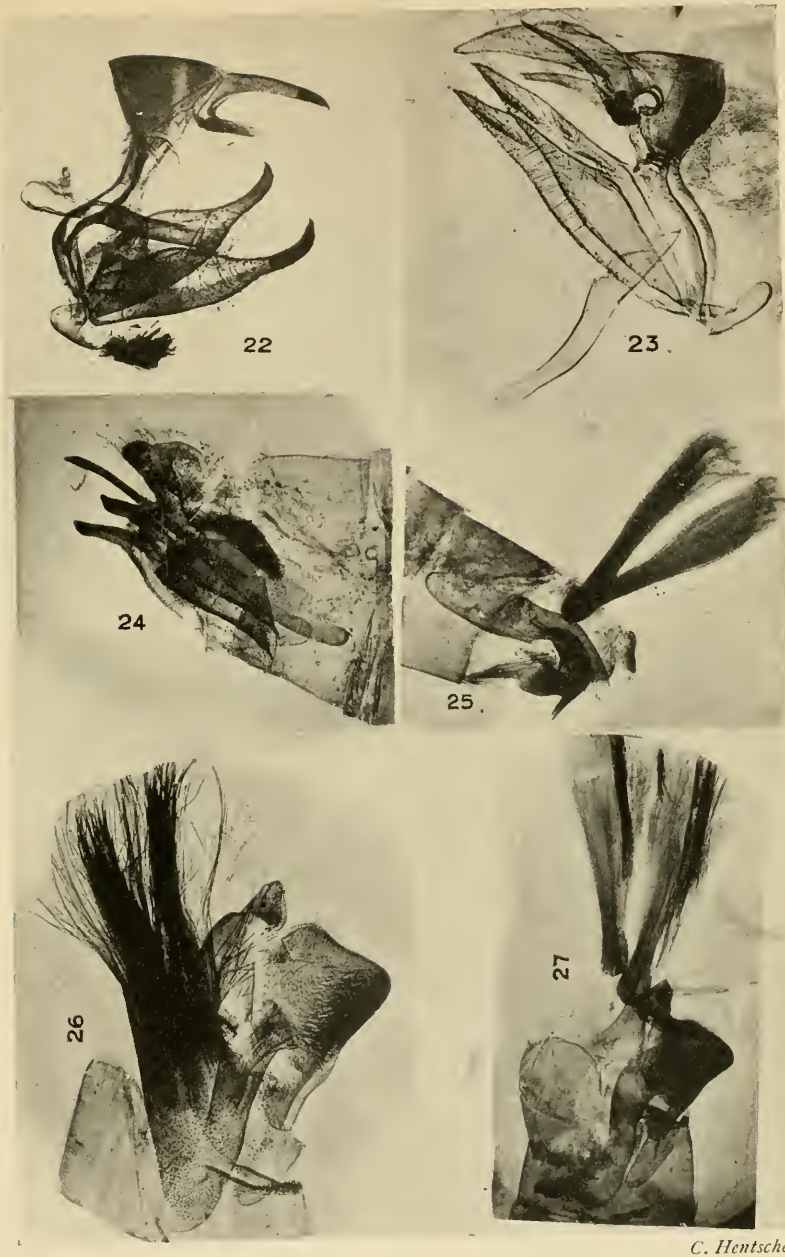
MALE SEXUAL ORGANS OF NYMPHALIDAE.



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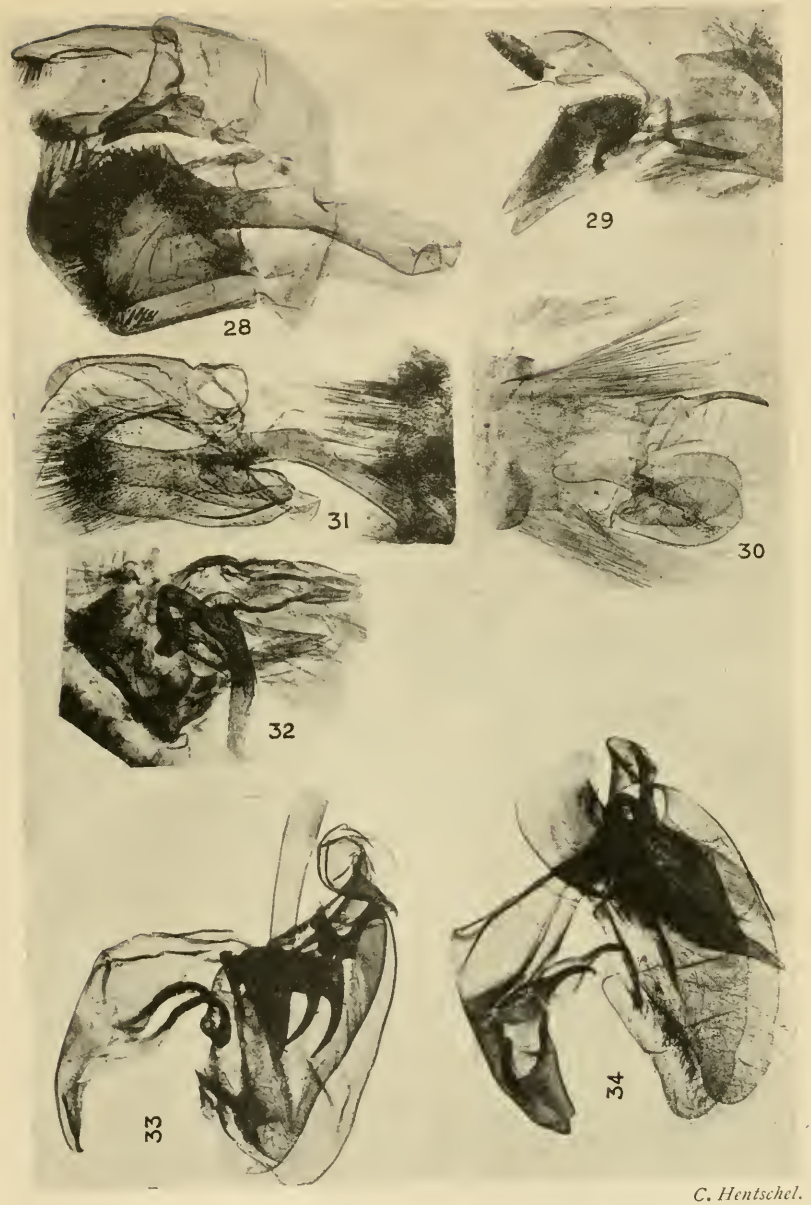

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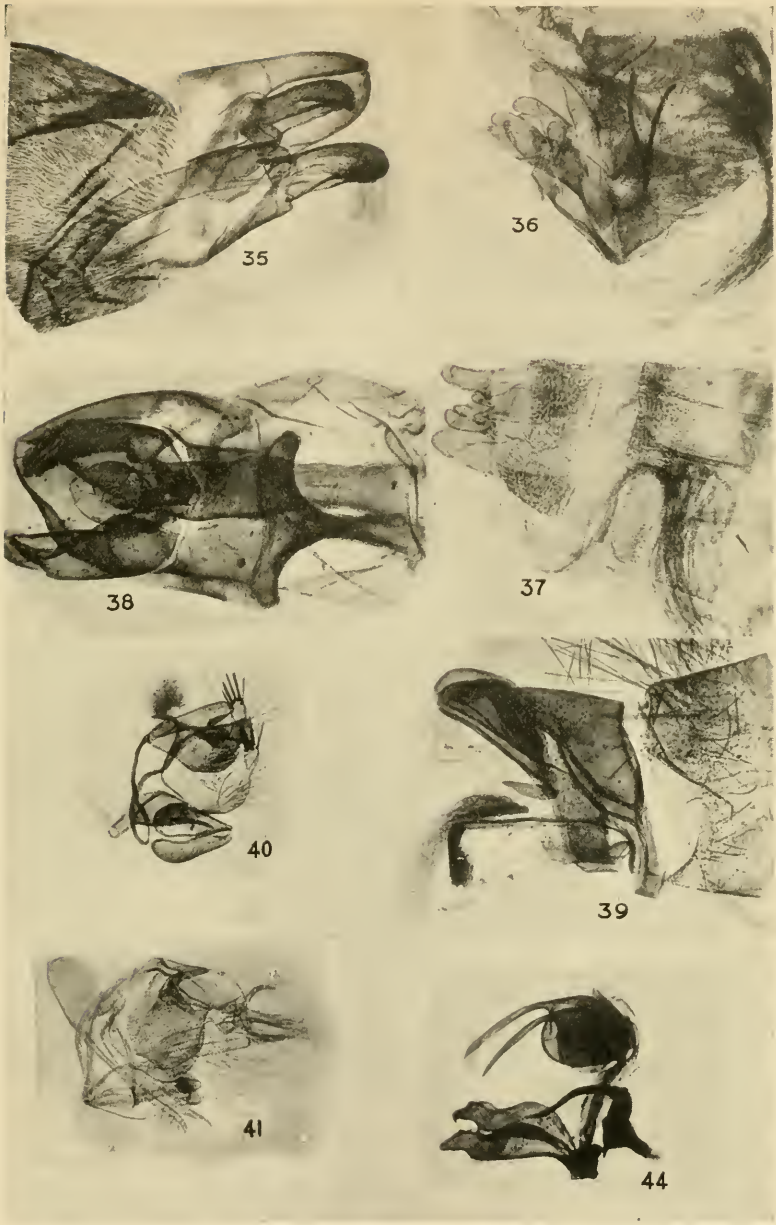
MALE SEXUAL ORGANS OF VARIOUS HETEROCERA GENERA.



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MALE SEXUAL ORGANS OF VARIOUS GENERA OF HETEROCERA AND RHOPALOCERA.

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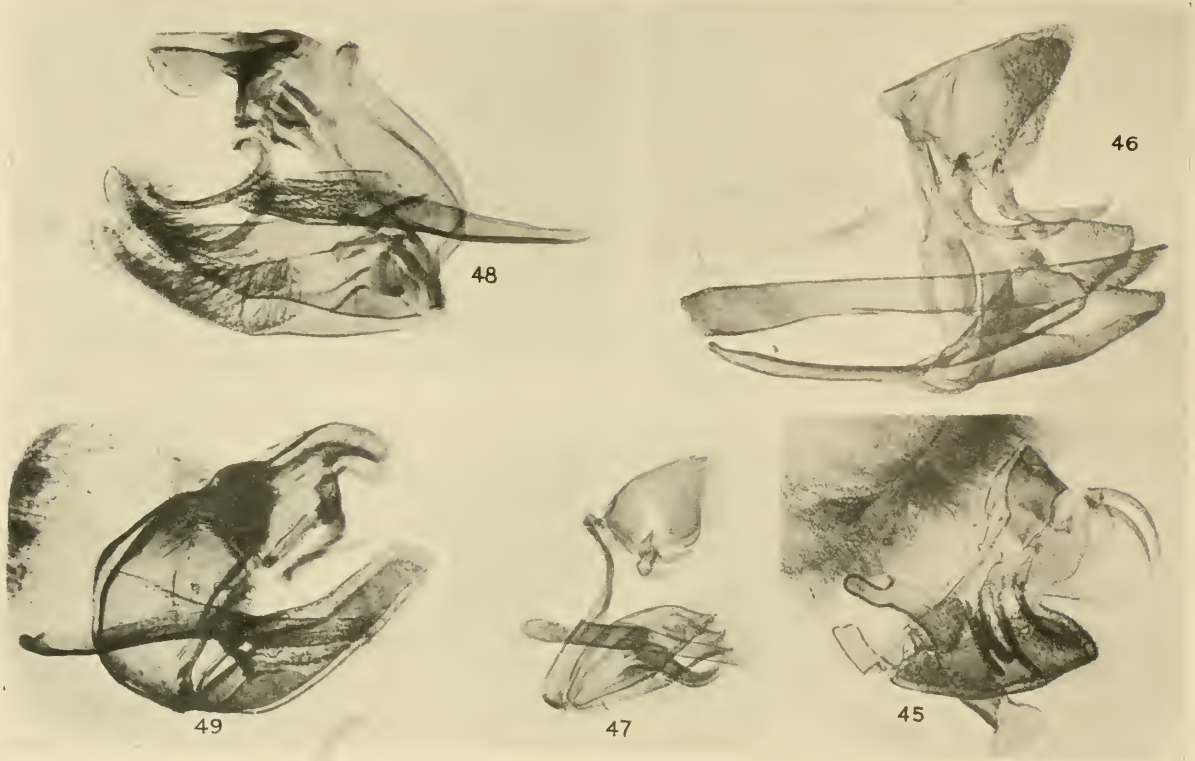
MALE SEXUAL ORGANS OF LIPHYRA BRASSOLIS.



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MALE SEXUAL ORGANS OF SOME RURALIDAE.

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CONTENTS OF PART II.

MEETINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON,

11 CHANDOS STREET, CAVENDISH SQUARE, W.

FOR THE

SESSION 1914–1915.

Wednesday, October	... ...	7
,, ,,	... ...	21
,, November	... ...	4
,, ,,	... ...	18
,, December	... ...	2
1915.		
,, January (ANNUAL MEETING)	... ...	20
,, February	... ...	3

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,, ,, 1903	2 2 6	2 2 6	1 11 10
,, ,, 1904	2 11 6	2 11 6	1 18 4
,, ,, 1905	1 10 0	1 10 0	1 3 0
,, ,, 1906	2 3 0	2 3 0	1 12 6
,, ,, 1907	1 18 6	1 18 6	1 9 0
,, ,, 1908	2 5 0	2 5 0	1 13 8
,, ,, 1909	1 12 0	1 12 0	1 4 0
,, ,, 1910	2 16 6	2 16 6	2 2 6
,, ,, 1911	3 4 0	3 4 0	2 8 0
,, ,, 1912	3 15 0	3 15 0	2 16 3
,, ,, 1913, Part I	0 12 6	0 12 6	0 9 6
,, ,, 1913, Part II	0 13 6	0 13 6	0 10 3
,, ,, 1913, Part III	0 10 0	0 10 0	0 7 6
,, ,, 1913, Part IV	0 12 0	0 12 0	0 9 0
,, ,, 1913, Part V	0 5 0	0 5 0	0 3 9
,, ,, 1914, Part I	1 1 0	1 1 0	0 15 9
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XII. The authorship and first publication of the "Jurinean" Genera of *Hymenoptera:* Being a reprint of a long-lost work by Panzer, with a translation into English, an Introduction, and Bibliographical and Critical notes.

By the Rev. F. D. Morice, M.A., and Jno. Hartley Durrant.

[Read December 3rd, 1913.]

This paper deals with a problem, which must first be solved, before any attempt to fix the Generic Nomenclature of Hymenoptera *according to the principle of "Priority" can be accepted as final. The problem is simply this*—when *were a number of Genera accredited by some authorities to Panzer, and by others to Jurine, first technically "published", and* who *was their real "author"?*

We believe that a complete answer to both questions is supplied by a long-forgotten Article, which is here reproduced by photographic processes from the only copy of it whose existence we have been able to discover. This Article was published at Erlangen in May 1801, *and contains* inter alia *a Synoptic List of the Panzer-Jurine Genera in which they are compared with the Genera adopted by Fabricius in* Ent. Syst. *Vol.* 2 (1793) *and its* Supplementum (1798). *We shall refer to this Synopsis in future as the* "Erlangen List," *and give reasons why Jurine is to be considered the author of any Generic Name made valid by it.*

This Article appeared anonymously in two instalments in a weekly publication. But in a footnote on p. 7 *of* Krit. Rev. (1806) *Panzer acknowledges himself to have been its author, and his statement is entirely borne out by internal evidence contained in the Article itself. This, however does not apply to the Synoptic List above mentioned. What Panzer claims in* Krit. Rev., *and what he manifestly has a right to claim, is* not *the first publication of* any Names at all (!) but *to have explained in this Article the method first devised by Jurine for classifying* Hymenoptera, *viz. the so-called "alary system" adopted in Jurine's* Nouvelle Méthode (*a work first announced for publication in* 1799, *submitted to Panzer for inspection at some time previous to May* 1801, *and ultimately published at Geneva in* 1807).

The present writers were led to make the investigations which have enabled them to republish these long-forgotten documents as follows—

They were in correspondence as to the probable correctness or otherwise of certain conclusions arrived at by Mr. Rohwer in his recent publications dealing with the Genotypes of Sawflies, and had arrived, by different lines of argument, at the same result: viz. that while Mr. Rohwer's conclusions generally seemed to follow logically from his premisses, certain of those premisses had been arrived at without examination of all available evidence, and had therefore been accepted

somewhat prematurely. Conspicuously this appeared to them to be the case with Mr. Rohwer's treatment of the "Jurinean" Genera. For various reasons they felt convinced that there was some mystery involved here, and that Mr. Rohwer had not succeeded in getting to the bottom of it. And it suddenly struck them both simultaneously (their letters on the subject actually crossing each other in the Post!) that the mystery might possibly be solved by ascertaining what exactly it was that Panzer had said *in the Articles alluded to by him on p.* 7 *of* Krit. Rev. *Vol.* **2.** *They determined therefore, if possible, to search out and examine those Articles.*

For a long time, however, it seemed that this search was doomed to failure, and that the Articles had disappeared beyond hope of recovery. Enquiry was made after them in all possible quarters, but not a trace of them could anywhere be found. At last, on a happy suggestion of Dr. K. Jordan, application was made to the authorities of the University at Erlangen; and, through the most kind and courteous assistance of Oberbibliothekar Dr. Heiland, it was ascertained that a copy of the Erlangen Litteratur-Zeitung *for* 1801, *containing the Articles in question, still existed in the Library of the University. It was too rare (perhaps even unique?) to be sent abroad for any purpose whatever; but we were most kindly provided with photographs (paper negatives) of the documents themselves, and from these negatives Messrs. André and Sleigh have made "blocks" from which our facsimile reproductions are now being printed. It has unfortunately been necessary to cut up the blocks, and thereby somewhat alter the appearance of the Articles, which were printed originally in 4to with double columns (in the style of the* Isis, Societas Entomologica, *etc.). Such an arrangement could only have been employed in the Pages of these Transactions, by making our reproductions copies on so reduced a scale of the negatives sent to us, that for any practical purpose they would have been almost, if not absolutely, useless. Except as above, we have tried to lay before our readers not only the substance but the actual form of the original publication. As a preliminary to this we have thought it may be worth while to put together a few notes—as follows—on the period* in *which Panzer and Jurine flourished, and the circumstances under which their chief works were produced.*

The Year of Grace 1793 was politically and socially one of the most eventful in European history. Nine of its months fall within Year I of the French Republican Calendar. It began with the trial and execution of Louis XVI (in January), and ended with the hideous massacres, etc., at Nantes (in December). It witnessed the first appearance in actual warfare of Napoleon Bonaparte, and the assumption of practical Dictatorship by Robespierre; also the guillotining of Marie Antoinette, Madame Roland, Charlotte Corday, and Philippe Égalité; the fall of the Girondins; the establishment of the "Reign of Terror"; the overthrow of the French Church and the deifying of Reason, etc., etc. In this year also commenced the long series of duels between France and Monarchical Europe,

in which Republics, Kingdoms and even Empires rose and perished, and the very foundations of the world seemed to be breaking up.

Yet amid all this distress of nations and perplexity, a more peaceful revolution—or rather evolution—quietly pursued its course. The scientific movement which we associate with the name of Linné was spreading and progressing in a manner which, considering the unrest and preoccupation in other matters of educated Europe in that age, cannot but seem to us surprising. Simultaneously Kirby in England, Lamarck and Latreille in Paris, Jurine in Switzerland, Klug in Germany, Fabricius in Denmark, Schrank in Austria, Rossi in Italy, and many other able men, continued to devote their best abilities to one and the same object, viz. a revised classification of the Linnean "Classis" *Insecta*. Many of these men had nothing else in common. Schrank was a Jesuit; Kirby a country clergyman; Lamarck and Latreille called themselves (perforce or voluntarily) "Citoyens," and worked under the aegis of the French Republic. Yet all considered themselves colleagues, and disciples of one master, the incomparable Linné (ob. 1778).

The present paper proposes *inter alia* to consider how certain of these men handled respectively one particular Ordo of the Linnean *Insecta*, viz. the *Hymenoptera*. These at that date had been divided into twenty genera, one of which was *Apis*. About a century later, the late E. Saunders was able to publish a list, from Britain alone, of twenty-eight genera, universally recognised as distinct, which in 1793 were still all included in the single genus *Apis*.

It was in this year (1793) that there appeared at Nuremberg, with a Preface dated the 21st of August, twelve sets of coloured figures with short diagnoses of German insects. Each figure, and each description, was on a separate sheet, and the sheets were not bound together, but packed in a sort of wrapper or envelope of coloured paper, bearing the date of its publication and a list of the insects figured therein. Corresponding titles were engraved on the plates, and printed as headings to the descriptions. This was the first instalment of a highly successful serial publication, which (with occasional intervals of suspension for a year or more at a time) continued to appear till 1813, certainly, and perhaps a little longer, under the direction of its first

editor, Dr. G. W. F. Panzer. Afterwards (at Regensburg) the work was continued by another editor; and it was finished, or left unfinished, about 1844. At present we are concerned only with Panzer's share in this work; and have nothing to say about its continuation in a later generation.

We purposely did not include Panzer among the systematists enumerated in a former paragraph, because his work was in no sense intended to be a contribution to systematics, but, simply, as an assistance to collectors in naming their insects according to the system adopted (at the time of his publication) by one particular author—viz. Fabricius, whom—to put the matter shortly—he treated as infallible. The title he gave to his work, which we shall cite hereafter as *Fn. Ins. Germ.*, was *Faunae Insectorum Germaniae Initia*—it was a book for *beginners*, and dealt only with *one local* Fauna. He publishes as "new" many *species*; but he neither characterises, nor intends to introduce as new to science, a single *genus*—at any rate when dealing with *Hymenoptera*. His own speciality, so far as he had one, was the *Coleoptera*; and he does not seem to have taken any considerable interest in *Hymenoptera* till some years after he commenced publication of *Fn. Ins. Germ.* Nor did he even attempt to make any contribution of his own to the systematics of that Order till 1806 (in a work to which we shall presently refer). It may be taken, therefore, that if, according to any of our present Codes, the mention of a generic name by Panzer in *Fn. Ins. Germ.* before 1806 makes Panzer its "author," he was its author, *not* by intention but *malgré lui!*

Whatever, from a modern point of view, may be thought as to the scientific or artistic merits of Panzer's Figures and descriptions, their publication undoubtedly gave a great stimulus to work on the *Hymenoptera*, and also, as we imagine, on other Orders, not in Germany only, but also in France and England, and this influence lasted as long as the publication itself continued. It is constantly quoted as evidence for the identification of particular species by such authors as—to take a few names at random—Kirby, Stephens, Shuckard, F. Smith in England; Latreille, Lepeletier de Saint Fargeau, Lucas in France; Klug, Taschenberg, and many others in Germany. And even now, it is occasionally necessary to consult it for the above purpose; though, for any other, it is practically obsolete. But it was never intended, nor thought to

be intended, as a contribution to the systematics of *Hymenoptera*.

Consultation of Panzer's *Fn. Ins. Germ.* is attended by several difficulties: (*a*) the plates are arranged in no order—one may represent a Bee, the next a Spider, the next a Beetle, etc.; (*b*) they were published with no Index, nor even List of Species for the whole work, only with a list on each envelope of the species figured in it; (*c*) the generic names used by Panzer are often no longer used in Panzer's sense, and he sometimes gives the same insect one name in an earlier fascicule (Heft) and another in a later; (*d*) the date of any particular Figure or diagnosis can seldom be ascertained without examining the wrapper which contained it, and not always then—besides, *bound* copies of the work often do not include these wrappers. Many of these difficulties may be to a large extent overcome by using the excellent Index published by the late E. Saunders, F.R.S. (Gurney and Jackson, London, 1888), to which the present writers desire to own their great obligation. But even this Index does not help us as to Panzer's obsolete and varying use of certain names: *e. g.* a Hymenopterist would suppose that *Macrocera lutea* cited in Saunders's Index must be a Bee, but it is in fact a *Dipteron!* And many of the species listed in the Index under *Tiphia* would not have been referred by Saunders himself to that Genus: one is a Bee, another some small parasitic species akin to the Proctotrupids, etc., another a Fossorial-wasp which Saunders would have called *Astata boops*. The addition to the Index of Saunders's own identification of each Panzerian species would have made the work not only invaluable, but almost unimprovable!

The particular authority invoked by Panzer to settle all questions as to the proper naming of Genera was (at any rate up to, and including, 1801) Vol. 2 of Fabricius's *Entomologia Systematica*, 1793; a *Supplement* to this work appeared in 1798, and thereafter Panzer follows the Supplement also. (N.B. *Entomologia Systematica* must not be confounded with the earlier *Systema Entomologiae* of the same author, 1775, though it *is*, more or less, a re-casting of it!) The *Ent. Syst.* was a very ambitious work, and intended not merely as a contribution to, but as a settlement of, the systematics of all *Insecta* from all parts of the world. Some of the Generic Names in it appear

there *for the first time;* others are repeated from the author's *earlier works*, and of these some were *not* first proposed by Fabricius, *but by Linné*. All these, however, when cited by Panzer, are accredited to Fabricius; and when writing of them collectively, he calls them the "*Fabrician* Genera" [*Fabriciussche* in 1801, *Fabriziussche* (sic) in 1806 !]. Every single Generic Name adopted for a Hymenopteron in *Fn. Ent. Germ.* up to 1799 is taken straight from *Ent. Syst.* or its *Supplement*, and is used, or meant to be used, *exactly in the Fabrician sense*.

But, about 1799, Panzer began to fall under a new influence, tending in a measure to draw him away from his former absolute dependence on Fabricius. He was getting into more and more frequent and intimate correspondence with an incomparably better Hymenopterist than Fabricius; with a man, in fact, who was the first real specialist on that Order; and who already, after many years' study of the subject, had practically completed an independent and highly original revision of the Order, relying especially on a character which Fabricius had left unnoticed, viz. the differences in "neuration" of their wings.

This new friend of Panzer's lived in 1799 at Bern; but soon after he removed to Geneva, where he became a Professor in its University, and there—but not till 1807—published, in its final form, the magnificent work, which he had practically completed, and even announced for publication, in 1799. (*Cf.* Jurine, *Nouvelle Méthode*, 1807, p. 13, foot-note.)

Jurine's *Nouvelle Méthode*, as it appeared in 1807, was (1) incomparably the most beautifully illustrated work dealing with *Hymenoptera* in existence, (2) a work introducing several entirely original characterisations of Genera, many of which remain to this day as foundations on which all systematists in dealing with this Order mainly build. But its real importance in entomological literature depends on neither of the above facts, but rather upon this—It ousted altogether (not at once, but within a very few years after its publication !) Fabricius and his "*Systema*" from the supremacy they had held so long. [Fabricius died in 1808, it is said from grief at the British bombardment of Copenhagen in 1807.] A new "Systema" had appeared, which on the whole may be said to have held the field ever since; though some of our best

Hymenopterists have succeeded in seeing for themselves and convincing others that the *neuration-characters* must no more be made an idol than the *instrumenta cibaria* of Fabricius, and that neither Fabricius nor Jurine can claim to have shown us once for all the infallible "characteres essentiales," by which Nature has *branded* or ticketed all living creatures in order that Man may be able to distinguish them! This is what the pre-Darwinian entomologists really meant by a "character," and the notion which still exists that there is some *essential* difference between "generic" and "non-generic" characters, "structural" characters and "colour" characters, "specific" characters and "varietal" characters, etc., etc., etc., is really not very different.

But though we now talk of Jurine's invention as a *System*—the "Alary System" and so forth—neither Jurine himself nor his contemporaries ever called it so. It was invariably called—not a System, but a Method. What is the difference? It seems to be this.

A System, or rather *The* System, is the *actual grouping of existences* which makes up the Universe. There can obviously be only *one* such System, and this Linné had called the "Systema Naturae," never claiming for a moment that he had made it or devised it, but only that he had *discovered* it. But a *Method* (*μέθοδος*) is something much humbler. It is simply a "way-towards" some desired goal. What Jurine claimed was simply this, to have devised a *new manner* of getting to the heart of things; —an easier, more rapid method, than that of Fabricius— but nothing more. This will have to be remembered, if we try to understand how it was possible for Panzer to think that Jurine's "Method" might be accepted without abandoning the only possible or conceivable "Systema," which "systema" to him meant simply—the Fabrician conception of *an Animal Kingdom based on certain essential differences between Animals which Nature had indicated by fashioning their "instrumenta cibaria" differently.* Believing this, and that such characters were the only really infallible and "natural" characters, Panzer could, and did, hold also, that animals might likewise have other characters, not in the strict sense "natural," but (as a matter of fact) so frequently accompanying the "natural" characters, that the presence of such and such an "artificial" character might give us a useful hint what the natural characters

of an animal possessing such an artificial character were likely to be.

One of the great merits which Panzer found in Jurine's wing-characters was just this—that they seemed to run more or less parallel with the Fabrician mouth-characters, and, in so far as they did so, to be approximately, even if not really, "natural." And Jurine himself either did not wish, or did not dare, openly to reject the claim made for the Fabrician characters that they were "natural." On the contrary, by figuring *mandibles* and antennae, as well as wings, in his Plates, he managed, very prudently, if it was done intentionally, to give the impression that, far from attacking the Fabrician characters, he was reinforcing them. And honest Panzer was only too willing to look at things in so satisfactory a light!

It is interesting to trace—for which purpose see Appendix A following this Introduction—the steps by which Panzer's confidence in Jurine is seen gradually ripening.

(*a*) First in 1799 we find Panzer telling the world through his *Fn. Ins. Germ.* that one Mr. Jurine of Bern was a very acute entomologist, who had got some "method" of his own for determining insects by their wings, who had sent him (Panzer) such and such insects, given him particulars of their "habitats," and was kindly going to give him more in future.

(*b*) Then in 1800, a year when the French and Austrians were cannonading each other under the walls of Nuremberg, Panzer publishes no instalment of the *Fn. Ins. Germ.* but waits for quieter times, and probably finds leisure to go more carefully into the "Proofs" and "Figures" of Jurine's forthcoming book, advertised last year, but not yet out.

(*c*) By May 1801 he had become convinced that this *Nouvelle Méthode* is an excellent idea, very convenient, and perfectly orthodox. He will give it a start, but in a quiet way, taking no responsibility for anything. So he gives it a favourable notice, not at Nuremberg (where his authorship would be recognised at once) but at Erlangen, where a new *Zeitung* in which he had some sort of interest was being started. The thing would make good "copy" for an Editorial; and he could do his friend a good turn without bringing his own name in at all, or making the readers of *Fn. Ins. Germ.* wonder if they were wanted to rename all their specimens. So he leaves his Articles

unsigned, and takes care to describe himself vaguely as "a German naturalist," whereas he gives the greatest possible prominence to the name of Jurine, and pays him the highest compliment he can by representing him as an able new aide-de-camp of the illustrious Fabricius.

Then once more he brings out a new instalment of *Fn. Ins. Germ.* containing several Figures contributed by and attributed to Jurine; mentions him repeatedly as authority for habitats, etc.; figures certain Jurinean *species* with Jurine's name attached, and even slips in a few Generic Jurinean names (once at least quite erroneously) in his Synonymy, while retaining Fabrician names on the corresponding Plates. He does not call these Jurinean Genera "*inedit*" (by which formula he denotes in all his works unpublished names of genera or species), because they had already been published at Erlangen!

(*d*) Three years pass during which the *Fn. Ins. Germ.* is again suspended. In the last of them Fabricius brings out (1804) his *Piezatorum*. Panzer girds himself again and brings out (1805) a new instalment of *Fn. Ins. Germ.*, at last using Jurinean names quite freely, even on the Plates, sometimes even where other names were employed for the same Genera in the *Piezatorum*. We suspect that this was accidental. Fabricius himself had introduced certain Jurinean Generic names into the *Piezatorum*, and Panzer may not have realised that he had rejected others, and thought that the new nomenclature as a whole had received Fabricius's *imprimatur*. [Or perhaps the Plates were engraved before the *Piezatorum* reached Panzer, and it was too late to alter them; even as Jurine had to explain in *Nouvelle Méthode* (1807) that he was obliged to leave certain names on the Plates, simply because the latter had been engraved long ago and could not now be altered.]

(*e*) Next year (1806) again no *Fn. Ins. Germ.*, but instead of it Panzer's first serious attempt to grasp and compare the nomenclature of Jurine and Fabricius (the latter as amended in the *Piezatorum*). This took the form of two small Volumes printed in Nuremberg, and entitled *Kritische Revision der Insektenfauna Deutschlands*—suggesting that it was meant *inter alia* as a sort of Guide-book to accompany the Plates, etc., of *Fn. Ins. Germ.* This title sufficiently describes its first Volume, which deals with *Coleoptera*. But Vol. **2** is devoted to *Hymenoptera*, and this Volume has an alternative title, which shows that Panzer had more

in his mind than a simple revision of his past work. The alternative title is as follows—

ENTOMOLOGISCHER VERSUCH

DIE

JÜRINESCHEN GATTUNGEN

DER

LINNÉSCHEN HYMENOPTERN

NACH DEM

FABRIZIUSSCHEN SYSTEM

ZU PRÜFEN: *etc.*

This is followed by a sort of Essay, written exactly in the style of the Erlangen Articles, and evidently a composition of the same writer. Like those Articles it maintains the thesis that the Jurinean Genera, far from upsetting the Fabrician system, really support it. Jurine's characters are excellent and practically most useful. They are easy to see and to distinguish. They indicate just the same divisions which Fabricius has discovered and Nature established in the Animal Kingdom. Really and essentially Animals are separated, and ought to be distinguished, by the differences in their mouth-parts, the *instrumenta cibaria*. This is the high-road to Truth, and Fabricius has shown it to us. But the high-road is long and sometimes rugged and difficult. We may shorten it, and make it easier, if we can, by taking side-paths and short-cuts, provided that we come back ultimately to the high-road, and own (even while we stray from it) that it is the one and only "Natural" method of approaching the Truth. Jurine's Method is such a short-cut. It is not the high-road itself, but it runs parallel with it, leads to the same goal, and is easier to follow. Therefore Jurine's "method" is lawful, as long as it does not lead us to abandon the Fabrician "system"; and that it in fact does *not* do so, is one of its principal merits.

(The above is not a translation, nor even a condensation

of Panzer's actual language, but we believe it represents fairly the thesis which he is maintaining.)

This Essay, then, to which the secondary Title really refers, is a sort of Apologia—minimising the differences between Jurinean and Fabrician methods, and showing that no one need feel any scruple or difficulty in using the former, so long as he retains his belief in the essential "naturalness" of the latter.

The rest of the book is mainly occupied with classifying the *Hymenoptera* previously figured and described by Panzer without order in the Plates of *Fn. Ins. Germ.* It only professes, as did the *Fauna* itself, to deal with German species. These are now arranged under Fabrician Generic names for the most part, but now and then with a Jurinean Genus upheld as a convenient receptacle for species which it was difficult to bring under Fabrician categories, or mentioned as synonymous with some section of a Genus, indicated by Fabricius, but not yet provided by him with a name of its own.

The Fabrician Genera of *Krit. Rev.* are, however, no longer taken solely from *Ent. Syst.* Fabricius in 1804 had revised his own classification and nomenclature in a new work dealing with *Hymenoptera* only, the *Systema Piezatorum*. It is this revised list of Genera which Panzer now adopts, and it is into these revised Fabrician Genera that he tries as far as possible to fit the species known to him, and often figured and described by him in the past under names which Fabricius once used but has now abandoned. In short the *Syst. Piez.* 1804 is to the *Krit. Rev.* 1806 exactly what *Ent. Syst.* **2.** 1792 was to *Fn. Ins. Germ.* 1793–1798, the source of its nomenclature, and the ultimate authority to which all enquirers are to be referred. There is, however, this difference in the situation—that Panzer has now undertaken not only to cite Generic names, but to distinguish Genera. And he has also a more difficult task before him than in 1793–8: (*a*) because he has to reconsider a previous nomenclature to which he had committed and accustomed himself, part of which is to be retained, and part abandoned; to do which he must ascertain for himself what Fabricius's recent changes in his nomenclature really amount to; (*b*) because he now recognises that some of the Jurinean Genera deserve names of their own, with which Fabricius apparently has not provided them; (*c*) because in the *Fn. Ins. Germ.* of the preceding

year, probably having then not thoroughly assimilated the substance of Fabricius's new proposals, he had done his best to popularise at least one Jurinean Generic name, for which Fabricius was now proposing another; (*d*) because Jurine was a friend whom he admired, to whom he was under great obligations, which he had tried to repay by doing all that he could to get Jurine's views a hearing from the "entomological public"; and he naturally did not wish to withdraw from his support of Jurine, if he could support him without rebelling against Fabricius.

It would require a very long and minute examination of the *Krit. Rev.* Vol. 2 to discover exactly how far Panzer succeeds in reconciling these conflicting motives, and carrying out the complicated programme which he has set himself, in this, his first attempt to come before the public in the character of a systematist.

It may be said, however, at once, that the *Revision* is a book in which it is often difficult to realise what are the author's own views, or whether he has any view of his own at all, on the merits of the nomenclature which he is discussing. The book is made also very puzzling by the author's eccentric way of quoting synonyms. First, in capitals, he gives the names which are to be sunk, and afterwards, in small italics, those which he intends to be adopted—thus exactly reversing the usual habit of authors! As a sort of Key to the scattered Figures, etc., of *Fn. Ins. Germ.* and a definition—such as it is—of the Fabrician, and a few of the Jurinean Genera, the book was probably more or less helpful to the German collectors for whom the *Fn. Ins. Germ.* had been intended. But it contributes absolutely nothing that can be called original to the systematics of its subject. At that we may leave it, adding only (if anything need be added) that the book is printed and generally "got up" in a very odd and as it were amateurish style, which reminds us that it appeared when the publishing and printing trade at Nuremberg was being conducted under disturbing circumstances, for it was in this same year that Napoleon was terrorising the Nuremberg booksellers, shooting one (Palm), and driving others to hide themselves, because a pamphlet had appeared there, of which he disapproved.

Although we may be blamed for importing into a question of entomological nomenclature so much of matter which may be thought extraneous and inadmissible as "not

evidence," we will venture a little further in that direction, and glance for a moment at the state of things in Switzerland, when Jurine, instead of publishing at Bern when his work was "actually in the press," transferred himself from Bern to Geneva and took his proofs with him. This we now know occurred between Aug. 1799 and May 1801. Consulting an *Encyclopedia* we come across a passage stating that "from 1799 to 1801 Switzerland was the theatre of the wars between the French, Russians, and Austrians." We find too that Geneva had been annexed by France in 1798, and that in 1801 the Peace of Amiens and the First Consulate of Napoleon filled mankind with hopes (which however were soon to be disappointed) that a new era of peace and prosperity had set in for all Europe, and more especially for France, now at the height of her greatness. Geneva, then, in 1801 seemed likely to be a desirable residence for a student and an author in prospect. Bern, on the contrary, was still in trouble politically; the French had upset its old government in 1798, and affairs there were still in chaos, till Napoleon finished what he called his "Mediation" of Switzerland in 1802. May we not conjecture from this, why it was that Jurine left Bern at this particular time, and why he did not publish there? Further, when arrived at Geneva, he would naturally not set about publishing *at once*. He had other things to think of, a new career to be taken up, new surroundings in which he had to "find his feet." Also he had now a new collecting ground; and in fact he tells us in the *Nouvelle Méthode* that he would have published sooner, if he had not formed exaggerated hopes of increasing his list of new Genera!

We have now seen how, when, and where the Jurinean Genera were first published: viz. as part of an Article, the rest of which was certainly written by Panzer, but for which he was careful to incur no responsibility till 1804 and throughout which he expressly and consistently called the Genera Jurinean (*Jurinesche!*) and brought Jurine's name to the front on every possible occasion; we know also now that these names date from May 30, 1801, and that they were published in a Journal which was purchasable by all men at Erlangen.

If we next proceed to compare the Erlangen List with the contents of the *Nouvelle Méthode* as finally published, we find that exactly the same Genera, numbered and arranged similarly, and applied to the same groups of species

occur in both publications with these differences: (1) One Genus has changed its name between the two publications and Jurine mentions that he has made this change, and says that he has done so deliberately. (2) Many species are added in the Geneva List to those mentioned in the Erlangen List. (3) Several new Genera are introduced in the Geneva List, and these Genera are not numbered at all, because, as Jurine explains to us, he was not acquainted with them when he had completed the body of his work and had also had his original Plates engraved. These therefore were supplementary—added to the work since 1800 when Panzer saw it.

We think these facts clearly indicate that though the Erlangen Articles were written by Panzer, the authorship of the List should be accredited to Jurine; and we have ourselves no doubt whatever, that the actual List was received by Panzer from Jurine, and that round it—so to speak—he wrote the Articles.

In support of our contention, we quote this Rule of the Zoological Congress (Berlin 1901, p. 951):—

—"S'il ressort clairement de la publication que ce" [*i. e.* celui qui l'a publié] "n'est pas l'auteur de celle-ci, mais bien un autre auteur qui est le créateur du nom et de la définition ou description, ce dernier doit être consideré comme l'auteur légitime du nom."

This Rule seems to express exactly the view which we venture to take; and we hold accordingly that Jurine and not Panzer is the "author" of all new names in the Erlangen List. They are expressly accredited to him there; and he unquestionably created and defined them himself. Panzer did not, and could not (in 1801) do anything of the kind, his own acquaintance with the characters of *Hymenoptera* being as yet far too superficial. In 1806, we believe, he made his *first* attempt in that direction when he proposed and defined the Genus *Osmia*.

It may still be asked—Why, then, did Jurine in the *Nouvelle Méthode*, 1807, seem to disclaim his authorship and accredit names of his own to Panzer? But we do not think much of this. Jurine could not foresee our present definitions of publication, authorship, etc., nor the importance now attached to Priority, Validity, etc., etc. After all, Panzer had first passed the Names through the press at Erlangen, and Jurine may have had no particular desire to take credit for them, just as Panzer had felt

no scruple about accrediting Linnean names to Fabricius. Similarly, when in the same work Jurine meets some criticisms on his method (neuration, etc.) made by Klug in 1803 with the retort that he had never published anything at that time "sur ce sujet," we need not consider whether or no he here disclaims authorship of the Genera, for (*a*) "ce sujet" surely means the neuration-characters, not the names of Genera; (*b*) it was quite true that the remarks on the merits of these characters in the Erlangen Articles were published by Panzer and not by Jurine; and (*c*) if, as a fact, and as "authorship" is now defined, Jurine was author of the names, no subsequent disclaimer can affect the situation in any way. If he *was* the author, he *was* the author, and no more needs to be said!

It is probable that Panzer was not the only colleague who had a sight of Jurine's work in its earliest form. But of this we have no positive proof. It is clear that Klug knew something about it in 1803; but he says nothing that he might not have learnt from the Erlangen publication in 1801.

Several allusions to Jurinean names are made by Latreille in Paris before the *Nouvelle Méthode* had appeared, as for instance when he mentions "*Astatus* dans le sens de Jurine et de Panzer"—the order in which he cites these names suggesting that he accredited the Genus to Jurine rather than to Panzer. So much, however, and also his attributing the name *Urocère* (meaning *Urocerus*) to "notre collègue Jurine," may merely indicate that he had seen certain Figures and descriptions in *Fn. Ins. Germ.*, viz. **83**·12 (published in 1801) and **85**·10 (*Astatus* on the Plate, *Urocerus* in the Text), 11, and 12 (published in 1801). But he says, also, and this implies more knowledge of the matter, that "ce savant" (*i. e.* Jurine) "publiera incessament une nouvelle méthode" (*sic*) "sur les hymenoptères, qui ne pourra manquer d'être bien accueilée." And in 1807 (the year when the *Nouvelle Méthode* at last appeared) Latreille remarks, as he finishes Vol. **3** of his *Gen. Crust. Ins.*, that just as the first part of his own book was going to press he received from his "friend" (*ami*) Jurine a copy of the magnificent new work just published at Geneva by the latter. (Which should be noted *inter alia* because it proves that, of these two works published both in 1807—the *Nouvelle Méthode* and *Gen. Crust. Ins.* Vol. **3**—the former was first published!)

Latreille proceeds to describe the form and contents of *Nouvelle Méthode* very fully and correctly; does full justice to the splendour of the illustrations, and the general excellence of the work; compares its terminology with his own; and quotes the whole List of Genera as we now find them there. He does not entirely endorse Jurine's views, still insisting that, when all is said, the *instrumenta cibaria* however minute, however difficult, etc., do yet supply the *primary* characters, but his criticism is very temperate and courteous, and he makes one entirely reasonable objection to Jurine's Ordo III, viz. that it is a very mixed group and requires, to make it satisfactory, much further subdivision. This remark is certainly not unjustified, for the Ordo in question besides Bees, Fossors, Ants, and Wasps, includes likewise the *Ichneumonidae* and *Braconidae*, and also *Chrysis*, *Leucospis*, and many minute parasitic groups!

And what did Fabricius himself think of the rival who was destined to overthrow him?

Practically he treated him rather badly. Somehow or other he got knowledge of quite a number of Jurinean names before 1804, in which year he published the *Systema Piezatorum*. And of these names he ignored some silently, *e.g. Bremus*, adopting instead Latreille's later name *Bombus*. Others he calmly appropriated to his own use without acknowledgment, *e.g. Prosopis*, which he cannot have invented independently since he uses it in the Jurinean sense. Others (the most flagrant case being that of *Cryptus*) he also appropriates without apology, and commits the unpardonable sin of deliberately creating a homonym! The older *Cryptus* of Jurine was a Sawfly! The new *Cryptus* of Fabricius was (and is still) the current name for an Ichneumonid! and this indefensible act of undetected piracy at present vitiates the whole nomenclature of an immense group of modern Genera. And the rest of the acts of Fabricius, and the evil that he did, and the Names that he stole from Jurine, will be discussed in our critical Notes. But at least he did try to make some kind of reparation to his victim by paying to him, in the Preface of *Systema Piezatorum*, a compliment, which, however grudgingly expressed, shows that Fabricius did not look on his rival as a mere ignorant upstart who had to be brought to his senses by a good shaking, or an obscure nobody whose claims to be an "author" were ridiculous, and who ought to be too thankful that the great Fabricius

should condescend to use his Names at all whether in his own sense or in any other.

This is what Fabricius says, enumerating those authors who had in various ways contributed to the progress of Entomology, and whose works he advises the "Lector Benevolus" to make use of until (as he amiably puts it) others produce better ones.

"Auctores hujus classis numerosi.

"*Scientiae heroes* systema condunt et characteribus certis bene elaboratis firmant. Linné, Latreille, et forte Jurine."

Then he goes on to enumerate lower orders of workers such as Ichniographi (here including Panzer), Descriptores, Observatores, Monographi, etc. But these do not now concern us. The point to be noted is that Fabricius himself, who of all men must have been most tempted to belittle Jurine, had the grace to acknowledge his rival's architectonic genius, and to rank him even hypothetically on a level with Linné and Latreille.

Appendix A. Jurine and Panzer.

The following Plates, or descriptions, of *Fn. Ins. Germ.* may be applied to for information as to the relations between Panzer and Jurine in certain years—

1799.	Heft 62.	Plates 6, 7, 8, 10, 13, 14, 18, 19.
1800.	Heft 76.	,, 11, 15, 16, 17, 18, 20.
1801.	Heft 82.	,, 10, 11, 12, 13.
	83.	,, 11, 12, 14.
	84.	,, 11, 12, 13, 20, 21, 22.
1804.	Heft 86.	,, 13.
	90.	,, 13.

besides others which we may have failed to notice. The great falling-off in numbers in the above List after 1801 requires explanation. It was probably due to the publication in 1804 of the *Piezatorum* which recalled Panzer's chief attention to his old master and led, *inter alia*, to the publication of *Krit. Rev.* in 1806.

Appendix B. Jurine and Fabricius.

To judge of the real progress in Classification made by Jurine before 1801 we may notice that—

Fabricius before 1804 had dealt with:—(*a*) *Three* (palaearctic) Genera of Jurine's Ordo I, *i. e.* Sawflies; (*b*) *Two* of

Jurine's Ordo II, *i. e. Evania*, etc.; (*c*) *Twenty-four* of Jurine's Ordo III, *i. e.* Aculeates, and Parasitica (except *Evania*, etc.). = 29 in all.

Whereas in 1801 Jurine had named (*a*) *Eleven* (palaearctic) Genera of his Ordo I; (*b*) *Four* of his Ordo II; (*c*) *Forty-eight* of his Ordo III. = 63 in all

—thus more than doubling the palaearctic List of known Genera! [Fabricius, however, had also dealt with many Exotic Genera which were unknown to Jurine.]

Appendix C. Panzer and Fabricius.

The following "Fabrician" names were adopted by Panzer from *Ent. Syst.* Vol. 2 before the appearance of the Erlangen List and introduced first into *Fn. Ins. Germ.* at the dates stated.

Andrena, Apis, Bembex, Chrysis, Crabro, Scolia, Tenthredo (1793).
Leucospis, Vespa (1794).
Chalcis, Hylaeus, Nomada (1796).
Ichneumon, Mutilla, Philanthus, Tiphia (1797).
Formica (1798).
Cynips, Eucera, Evania, Mellinus, Sirex, Sphex (1799).
Also from the Supplementum of *Ent. Syst.*
Banchus, Pompilus (1798).

Till after the appearance of the Erlangen List, Panzer never even alludes to any other Genus of *Hymenoptera* except the above. Nor does he, we believe, intentionally (apart from allusions in his Synonymies) accept and introduce any others into *Fn. Ins. Germ.* before 1804.

We now reproduce the Article in its original German form, and also the Titles (shewing dates, pagination, etc.) of the two issues of the Zeitung containing it. Three curious slips of the original editor, or printer, will be noticed: viz. (*a*) both Numbers are headed "N^ro. 21"—they should be "N^ro. 20" and "N^ro 21" respectively!; (*b*) "*entomolischen*" (*sic*) is used for "*entomologischen*" in the heading prefixed to both parts of the article; (*c*) most perplexing of all, the dates given by the publishers are Saturday May 25th, and Saturday May 30th, 1801, which is obviously absurd. We imagine that the *real* dates were May 23rd, and May 30th, 1801, both of which fell on a Saturday.

Erl. Litt-Zig. 1. 153-4 (23. V. 1801).

152

Grâces pour Pan
1 18. de 100 pag.

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au 8. (Pr. 75 c.)
tenant une notice
ieurs, les pièces
30 c. et 2 fr. 25 c.

INTELLIGENZBLATT
DER
LITTERATUR-ZEITUNG.

Erlangen, Sonnabends am 25. May 1801.

I.

Bemerkung eines auf der Universitätsbibliothek zu

Ich bemerke nur, dass es mit dem, was *Mosch*, *Panzer* und *Zapf* von dieser Bibel sagen, übereinkommt. Nur in den Blätterzahlen haben sich die Genannten geirrt. Wenn

Erl. Litt-Ztg. I. 160 (23. V. 1801).

V. Vermiſchte Nachrichten.

Nachricht von einem neuen entomoliſchen Werke, des Hrn. Prof. Jurine in Geneve.

Verſchiedene öffentliche Blätter und Zeitſchriften, haben ſchon vorläufige Nachricht von einem für die Entomologie äuſserſt wichtigen Unternehmen gegeben, dem ſich einer der achtungswürdigſten und vorzüglichſten Entomologen, Hr. Prof. *Jurine* in Geneve unterziehen werde. Gegenwärtig kann man dieſe Nachricht nicht nur beſtätigen, ſondern ſie auch mit der Anzeige dahin erweitern, daſs dieſes Unternehmen, wirklich ſeiner Vollendung nahe, das Werk ſelbſt unter der Preſſe iſt, und bereits *ſieben* vortrefflich geſtochene Kupfertafeln, in med. quarto, von dem Hrn. Verf. einem teutſchen Entomologen, als Probe, zur vorläufigen Einſicht überlaſſen worden ſind.

Man kann daher das entomologiſche Publikum, nun einſtweilen, bis das Werk ſelbſt ſprechen kann, etwas näher mit dem Plane dieſes Unternehmens bekannt machen, und die Abſicht des *Hrn. Verf.*, den vorliegenden Blättern gemäſs, vorläufig detailliren.

Zum Hauptgegenſtande ſeiner entomologiſchen Beſchäftigungen, wählte Hr. Prof. *Jurine* ſeit Jahren, faſt ausſchlieſslich und mit Vorliebe, diejenige Klaſſe der Inſekten, welche der ſeel. Archiater von *Linne Hymenoptera* und Hr. Prof. *Fabricius Piezata* genannt haben, und klaſſificirte ſolche nach einer neuen vorhin nicht angewendeten *Methode*.

Das Fundament derſelben beruht *auf den Flügeln* der darunter gehörigen Arten, vorzüglich aber, auf den daſelbſt bald mehr, bald minder netzartig ſich vertheilenden Gefäſsen, oder den ſogenannten Nerven und Adern. Jedoch ſind die drey Ordnungen, in welche dieſe Inſektenklaſſe von dem Hrn. Prof. *Jurine* ſubdividirt worden iſt, lediglich von dem Sitze und der Anheftung des *Unterleibes* (Abdomen), *an das Bruſtſtück* (Thorax) hergenommen, nämlich ſo: Ordo I. *Abdomine prorſus ſeſſili.* Ordo II. *Abdomine* ſupra thoracem infixo. Ordo III. *Abdomine petiolato: petiolo pone thoracem infixo.*

Unter dieſen *drey* Ordnungen ſtehen nun die ſämmtlichen *Gattungen* (Genera) der hieher gehörigen *Gall - Schlupf - Blatt - Gold* u. ſ. w. *Weſpen*, der *Wald - Blumen - Trauer Bienen, Hummeln, Mutillen, Ameiſen* u. ſ. w.

INTELLIGENZBLATT
DER
LITTERATUR-ZEITUNG.

Erlangen, Sonnabends am 30. May 1801.

Erl. Litt-Ztg. I. 161–2 (30. V. 1801).

I. Vermiſchte Nachrichten.

Nachricht von einem neuen entomoliſchen Werke, des Hrn. Prof. Jurine in Geneve (Beſchluſs).

Die *Hauptcharaktere* (Characterce primar.) *der Gattungen* ſelbſt, beruhen zwar vorzüglich und faſt ausſchlieslich, auf den Gefäſen oder den Nerven und Adern der Flügel, je nach dem jene bald mehr bald minder, Z. B., ſo beſtimmt die *zweyte Cellula cubitalis* mit ihrem Stielgen (*petiolata*) den vorzüglichen generiſchen Charakter von *Nyſson*: die *cellulla cubitalis incompleta*, den ganz eigenen der *Chryſis*: ſo wie eine eigene *lineola fecans* der *cellula radialis*, den Charaktor der Gattung *Bremus*.

Die II, III, IV und Vte Kupfertafel verſinnlicht nun dieſe generiſchen Charactere, in genau und hinreichend

Erl. Litt-Ztg. I. 161 (30. V. 1801).

I. Vermiſchte Nachrichten.

Nachricht von einem neuen entomoliſchen Werke, des Hrn. Prof. Jurine in Geneve (Beſchluſs).

Die *Hauptcharaktere* (Characteres primar.) *der Gattungen* ſelbſt, beruhen zwar vorzüglich und faſt ausſchlieslich, auf den Gefäſen oder den Nerven und Adern der Flügel, je nach dem jene bald mehr bald minder, durch ihre anaſtomoſenartigen Verkettungen, und netzförmigen Verbindungen, ſich verflechten, und dadurch verſchiedentlich geformte Cellen, Geflechte und Netze bilden; indeſſen, und um dieſen ſtehenden — durch jene möglichen grofsen Modifikationen, zur Errichtung natürlicher Generum äuſserſt pertinenten — Charakter, nicht in eine zwangvolle Einſeitigkeit ausarten zu laſſen, ſind zugleich auch die verſchiedenen Formen der *Fühlhörner* (Antennae), ſo wie die *Kinnladen* (Mandibulae), als *Characteres ſecundarii*, mit in ſubſidium genommen worden, doch ſind die Anaſtomoſen der Flügeladern und Nerven, ſtets die erſten oder ſtehenden Characteres der generum.

Indeſſen verhält es ſich, bey Errichtung der Generum mit dieſen Anaſtomoſen doch ſo, dafs einige den Charakter der Gattungen beſtimmen, andere hingegen, und zwar ſtets auf dem nämlichen Flügel, den Charakter der *Arten* (Species) angeben.

Jeder Flügel, der unter dieſe Klaſſe gehörigen Inſekten, wird im Allgemeinen nach ſeinem Umriſſe eingetheilt: in 1) *Baſis*, 2) *Apex*, und 3, 4) *Margines*.

Jeder Flügel wird ferner nach ſeinem Flächeninhalte den die ſich durchkreuzenden Gefäſe, und daher entſtehenden Anaſtomoſen der Nerven, bilden, abgetheilt: 1) in das *Punctum*, 2) den *Radium*, 3) den *Cubitum*, 4) die *Nervos brachiales*, 5) die *Cellulas radiales*, 6) die *Cellulas cubitales*, und 7) in die *Nervos recurrentes*. Die 5. 6. 7. geben indeſſen genau nur diejenigen characteres generum ab, die bey Errichtung der Gattung unentbehrlich ſind: ſie ſind daher auf *Tab. I, der Inſtruktionstafel, roth* gezeichnet, um dieſen Charakter ſogleich in das Auge faſſen zu können.

Erl. Litt-Ztg. 1. 162 (30. V. 1801).

Z. B., ſo beſtimmt die *zweyte Cellula cubitalis* mit ihrem Stielgen (*petiolata*) den vorzüglichen generiſchen Charakter von *Nyſſon*: die *cellula cubitalis incompleta*, den ganz eigenen der *Chryſis*: ſo wie eine eigene *lineola ſesans* der *cellula radialis*, den Charakter der Gattung *Bremus*.

Die II, III, IV und Vte Kupfertafel verſinnlicht nun dieſe generiſchen Charactere, in genau und hinreichend vergröſsert abgebildeten *Flügeln*, ſehr deutlich. Die II, IIIte, ſtellt jede, in 20 viereckigten Fächern, eben ſo viele Flügel, oder eben ſo viele Genera dar; auf jeder der folgenden (IV und V) aber ſind in 24 etwas kleinern Fächern, eben ſo viele Flügel oder Genera, mit ihrer Nomenklatur, gezeichnet. Man kann nun, wenn man den *Clavem methodi* beſtimmt gefaſst hat, ſich ſehr leicht zu rechte finden. Ueber alles aber gehen, um die Kenntniſs dieſer Methode zu erleichtern, die auf den nachfolgenden Tafeln (jede zu neun viereckigten Fächern) und zwar, nach den nunnachahmlich genauen und ſchönen Mahlereyen des Hrn. Prof. *Jurine*, von der Meiſterhand des Bürgers *Maſſol*, ganz ausgeſtochenen Arten, ſo dafs einem jeden eigenen Genus, auch eine beſondere Art gewidmet iſt. Nicht nur enthält demnach, jedes Fach oder Viereck, das ganze Inſekt complett, und wenn es nöthig war, auch anſehnlich vergröſsert, ſondern auch beſonders ein Fühlhorn, öfters auch dieſes nach beyden Geſchlechtern, ſo wie eine Kinnlade unter ſtärker Vergröſserung, nebſt dem Namen des abgebildeten Inſekts. Auf dieſem Weg wird es faſt unmöglich ſich zu irren, und wenn man bey eigenen Unterſuchungen, auch von den nicht vorgeſtellten, die Gattungsrechte auszumitteln ſucht, ſo wird man, wenn man nur vorher, die Flügeltafeln conſuliren will, ſich mit Beyhülfe dieſer generiſchen Tafeln, ſo zu rechte finden, dafs ſodann in der Folge jeder Verirrung ſicher ausgewichen werden kann.

Die Gattungen ſelbſt, werden durch die über Erwarten *einfachen* Charaktere der Flügel, Fühlhörner und Kinnladen äuſserſt *natürlich*; das ſcheinbare, geſuchte oder künſtliche, hört dann ſtufenweiſe auf künſtlich zu ſeyn,

und man ſieht dann nur, die ſelbſt von der Natur, unter eine Firma zuſammen geſtellten Arten, die nach ſo richtigen Regeln an einander gereihet ſind, ſo daſs es zu verwundern iſt, warum man ſie der Natur nicht ſchon früher abgelauſchet hat.

Um daher die Freunde dieſer Inſekten vorläufig ſelbſt mit den, nach dieſer Methode errichteten *Generibus* bekannt zu machen, ſo werden hier ſolche nicht nur mitgetheilt, ſondern auch den bereits bekannten *Fabricinsſchen* gegenüber geſtellt, wornach es dann leichte wird, dieſe Genera des Hrn. Prof. *Jurine* mit denen des Hrn. Prof. *Fabricius* zu vergleichen, oder, wenn es angeht, zu combiniren.

Ordo I. *Abdomine prorſus ſeſſili.*

Jurine.	*Fabricius.*
Gen. 1 *Tenthredo*	*Tenthredo:* antennis clavatis
Gen. 2 *Cryptus*	*Tenthredo:* antennis inarticulatis
Gen. 3 *Allantus*	*Tenthredo:* Scrophul. viridis etc.
Gen. 4 *Dolerus*	*Tenthredo* germanica, gonagra etc.
Gen. 5 *Nematus*	*Tenthredo* capreae, ſeptentrional. etc.
Gen. 6 *Pteronus*	*Tenthredo:* antennis pectinatis.
Gen. 7 *Cephalcia*	*Tenthredo:* antennis multiarticul.
Gen. 8 *Oryſſus*	*Oryſſus* Supplem.
Gen. 9 *Aſtatus*	*Sirex* pygmaeus. *Banchus* ſpinipes *Panzer* (*Banchus* viridator *Fabric. inedit.*)
Gen. 10 *Urocerus*	*Sirex* Camelus, Dromedarius.
Gen. 11 *Sirex*	*Sirex* Gigas.

Ordo II. *Abdomine ſupra thoracem infixo.*

Gen. 1 *Evania*	*Evania* appendigaſter, minima: praeter utramque nulla.
Gen. 2 *Foenus*	*Foenus* Supplem.
Gen. 3 *Aulacus*	
Gen. 4 *Stephanus*	*Ichneumon* ſerrator Supplem.

Erl. Litt-Ztg. 1. 163 (30. V. 1801).

Ordo III. *Abdomine petiolato: petiolo ponc thoracem infixo.*

Gen. 1 *Ichneumon*	*Ichneumon.*
Gen. 2 *Anomalon*	*Ichneumon.*
Gen. 3 *Bracon*	*Ichneumon* defertor, denigrator.
Gen. 4 *Pompilus*	*Pompilus* Supplem.
	Evania punctum.
Gen. 5 *Sphex*	*Sphex.*
Gen. 6 *Pfen*	*Sphex* atra.
Gen. 7 *Stigmus*	
Gen. 8 *Apius*	*Sphex* figulus.
Gen. 9 *Larra*	*Larra.*
Gen. 10 *Dimorpha*	*Tiphia* abdominalis *Panzer.*
Gen. 11 *Tiphia*	*Tiphia.*
Gen. 12 *Scolia*	*Scolia.*
Gen. 13 *Sapyga*	*Scolia* Prisma.

Erl. Litt-Ztg. 1. 164 (30. V. 1801).

Jurine.	*Fabricius.*
Gen. 14 *Myrmosa*	*Hylaeus* thoracicus.
Gen. 15 *Vespa*	*Vespa.*
Gen. 16 *Bembex*	*Bembex.*
Gen. 17 *Masaris*	*Masaris.*
Gen. 18 *Simblephilus*	*Philanthus* pictus *Panzer.*
Gen. 19 *Mellinus*	*Mellinus* ruficornis. Crabro U flavum *Hellwig.*
Gen. 20 *Arpactus*	*Mellinus* myftaceus, quinquecinctus.
Gen. 21 *Alyffon*	*Sphex* fuscata. *Pompilus* fpinofus *Panzer.* *Pompilus* tumidus *Panzer.*

Gen. 22 *Nyſſon*	*Crabro* ſpinoſus: trimaculat. *Roſſ.* Mellin. interruptus. *Fabr.* Pompil. maculatus. *Fabr.*
Gen. 23 *Philanthus*	*Philanthus* laetus, arenarius. *Crabro* labiatus *Fab.*
Gen. 24 *Gonius*	
Gen. 25 *Miſcophus*	
Gen. 26 *Dinetus*	*Crabro* pictus, *Pompilus* guttatus.
Gen. 27 *Crabro*	*Crabro.*
Gen. 28 *Cemonus*	*Crabro* unicolor *Panzer.*
Gen. 29 *Oxybelus*	*Crabro* lineatus, uniglumis, biglumis.
Gen. 30 *Proſopis*	*Sphex* annulata, ſignata *Panzer.* *Hylaeus* annulatus *Fab.* *Mellinus* atratus *Fab.* inedit.
Gen. 31 *Nomada*	*Nomada* ruficornis etc.
Gen. 32 *Andrena*	*Andrena* ſuccincta, bicolor.
* Bullae alarum in *Nomadis* et Andrenis ſemper reperiuntur in nervis cubitalibus et recurrentibus.	*Andrena* (Nomad. Fabr. inedit) lobata *Panzer.* *Nomada* gibba *Fabr.* *Andrena* muſciform. *Roſſ.* (*Nomada Nigrita* *Fabr.* inedit.)
Gen. 33 *Laſius*	*Apis* quadrimaculata *Panzer.*
Gen. 34 *Crociſa*	*Apis* punctata. *Nomada* ſcutellata, *Andrena* armata *Panzer.*
Gen. 35 *Apis*	*Apis* mellifica: *praeter hanc nulla.*
Gen. 36 *Trachuſa*	*Apis* maculata, bicornis, fuſca, rufa. *Apis* cornigera. *Roſſ.* fronticornis. (Taurus Fabr. inedit.) – *Panzer.* aterrima *Panzer.*
Gen. 37 *Bremus*	*Apes bombinatrices.*
Gen. 38 *Mutilla*	*Mutilla.*
Gen. 39 *Formica*	*Formica.*
Gen. 40 *Cynips*	*Cynips. Ophion* cultellator.
Gen. 41 *Chelonus*	*Ichneumon* oculator.
Gen. 42 *Chryſis*	*Chryſis. Ichneumon* auratus. ſemiauratus.
Gen. 43 *Omalus*	

165

Jurine.	*Fabricius.*
Gen. 44 *Ceraphron*	
Gen. 45 *Leucopsis*	*Leucopsis.*
Gen. 46 *Codrus*	
Gen. 47 *Chalcis*	*Chalcis. Cynips* armata *Panzer.* plurcsque *Ichneum. minuti.*
Gen. 48 *Pfilus.*	*Tiphia* cenoptera *Panzer.*

Aus vorangehender Parallele bemerkt man leicht, wie sich die *Jurineschen Gattungen* gegen die *Fabriciusschen* verhalten; wie sehr sich manche jener, diesen nähern; wie *natürlich* auch viele *Fabriciusche Gattungen* sind, die selbst durch die Anwendung dieser neuen Methode nicht verdrängt werden konnten; dass aber auch diese Insektenklasse durch letztere wieder darum ungemein vieles gewinnen musste, weil Hr. P. *Jurine* neben den Flügeln auch auf diejenigen Theile Bedacht nahm, deren Dignität Hr. P. *Fabricius* bey seiner Klassifikation mit so viel Scharfsinn beherzigte.

Ein Mehreres noch über Hrn. Prof. *Jurine's* Unternehmen zu sagen, würde zu sehr die Grenzen einer blos vorläufigen Anzeige überschreiten. Es sey das bisher Gesagte hinreichend, bis dieses Werk selbst zu Wort kommen kann.

Translation.

When the translation here following was written, we had not yet decided to reproduce in facsimile more of the original Articles than the tabulation of the Genera; and accordingly more pains were taken than now seem necessary to retain the precise form of the original even in minute details, such as the use of Capitals, and Italics, the varying employment of Latin and German in technical terms, the involved syntax of the author (often making his meaning obscure to a foreign reader), and the frequently erratic punctuation. A freer version, under the present circumstances, might have been more useful to the generality of readers; but we think it hardly necessary that the whole work should be done over again, and therefore rest content with adding explanatory notes where we feel any

doubt, either as to what is really meant in certain obscure passages, or as to whether we have succeeded in expressing what we believe to be their meaning intelligibly.

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(1) The First Part of the Article (23 May, 1801).

("*Sonnabends am* 25 *May*, 1801")

V. Miscellaneous Notices.

Notice of a new Entomological Work by Hr. Prof. Jurine of Geneva.

Several published Papers and Serials have already given Notice in advance of an Enterprise extremely important to Entomology, which is to be undertaken by one of the most estimable and excellent of Entomologists, Hr. Prof. *Jurine* of Geneva. We can now not only confirm this Notice, but supplement it by the Statement, that this Enterprise is now really near Completion, the Work is actually in the Press, and already *seven* admirably engraved Copper-plates in med. quarto have been communicated by the Author to a German Entomologist * as Proofs for Inspection in Advance.

Provisionally therefore, until the Work can speak for itself, we can now make the entomological Public somewhat more closely acquainted with the Plan of this Enterprise, and detail in advance the Design of the *Author*, according to the Sheets that lie before us.

As Main-subject of his entomological Pursuits, Hr. Prof. *Jurine* has for years chosen, almost exclusively and by Preference, that Class of the Insects, which the late Chief-physician † von *Linne* has named *Hymenoptera* and Hr. Prof. *Fabricius Piezata;* and classified them by a novel *Method* ‡ never previously employed.

Its Foundation rests *on the Wings* of the Insects included therein, but especially on the Vessels dividing them, sometimes more, sometimes less reticulately, or what are called the Nerves and Veins. The three Orders, however, into which this Class of Insects has been subdivided by Hr.

* No doubt Panzer himself.

† Linné held this appointment in the Court of the King of Sweden.

‡ *Nouvelle Méthode*, it will be remembered, is the title which Jurine adopted for his book.

Prof. *Jurine*, are taken solely from the Situation and Attachment of the *Unterleib* (Abdomen) *on to the Brust-stück* (Thorax), in short as follows: Ordo I. *Abdomine prorsus sessili.* Ordo II. *Abdomine* supra thoracem infixo. Ordo III. *Abdomine petiolato: petiolo pone thoracem infixo.* Accordingly under these *three* Orders are placed the whole company of *Gattungen* (Genera) *Gall- Schlupf- Blatt- Gold-* etc. *Wespen*, the *Wald- Blumen- Trauer Bienen*, *Hummeln*, *Mutillen*, *Ameisen*,* etc.

(2) The Second Part of the Article (30 May, 1801).

("*Sonnabends am* 30 *May*, 1801.")

I. Miscellaneous Notices.

Notice of a new Entomological Work, by Hr. Prof. Jurine of Geneva. (*Conclusion.*)

The *Main characters* (Characteres primar.) *of the Genera* themselves, rest indeed chiefly and almost exclusively on the Vessels or the Nerves and Veins of the Wings, according as these sometimes more, sometimes less, interlace themselves by their anastomosis-like† Concatenations and reticulate Connections, and form thereby variously shaped Cells, Lattices and Nets; but at the same time, lest this standing Character—so admirably adapted by reason of these it may be great Modifications, for the Establishment of natural Genera—should deteriorate into a cramping One-sidedness, the various Shapes of the *Fühl-hörner* (Antennae) and likewise the *Kinnladen* (Mandibulae) are also taken in subsidium as *Characteres secundarii;* though the Anastomoses of the Wing-veins and Nerves are still always the foremost or standing Characters of the genera.

At the same time it so happens that in the Establishment of the Genera by help of these Anastomoses, some

* Panzer uses these same popular German names, along with the Latin names cited from *Syst. Ent.*, throughout his *Fn. Ins. Germ.* Most of them are still in use colloquially in German; but we do not know whether this is the case as to the Waldbienen, Blumenbienen, and Trauerbienen, and have failed to gather from his work how he distinguished these groups from one another. Together they seem to include most *Anthophila*, except the Humble-bees (Hummeln).

† By this technical word Panzer's contemporaries (*e.g.* Kirby) were accustomed to express the running of one nervure into another, as a tributary *discharges* into a river, *cf.* (French) *déboucher* and (Engl.) *disembogue.* στόμα = bouche, mouth.

of them indicate the Character of the Genera, while others on the contrary, and that regularly in the self-same Wing, declare the Character of the *Arten* (Species).*

Every Wing of the Insects belonging to this Class is divided as to its general Outline: into (1) *Basis*, (2) *Apex*, and (3, 4) *Margines*.

Every Wing is further divided as to the Areas contained in it shaped by its interlacing Vessels, and the resulting Anastomoses of the Nerves: into (1) the *Punctum*, (2) the *Radius*, (3) the *Cubitus*, (4) the *Nervi brachiales*, (5) the *Cellulae radiales*, (6) the *Cellulae cubitales*, and (7) the *Nervi recurrentes*.† 5, 6, 7, however, furnish precisely those characteres generum only, which are absolutely necessary for Establishment of the Genus: they are therefore marked *red* ‡ in *Tab. I of the Instructionstafel*, to make this Character catch the eye at once.

So, for Instance, the *second Cellula cubitalis* with its Stielgen (*petiolata*) betokens the principal generic Character of *Nysson:* the *cellula cubitalis incompleta* the altogether exceptional one of *Chrysis:* just as a peculiar *lineola secans* in the *cellula radialis* § indicates the character of the Genus *Bremus*.

Plates II, III, IV and V bring out very clearly these generic Characters in exactly || and adequately enlarged representations of *Wings*. II and III each represent, in 20 quadrangular Compartments, just so many Wings or just so many Genera: on each of those following (IV and

* The meaning here may perhaps be made clearer by giving an example. The Genus *Miscophus* is known by a peculiar "petiolated" cell, and its various Species show, in the same cell, further characteristic differences of their own.

† Panzer here and elsewhere, after the old German fashion, treats the Latin terms which he is quoting according to the rules of Latin syntax, *i. e.* writes them as *accusatives*. We have thought it unnecessary to follow the original in this respect.

‡ This is not the case in the copies of the *Nouv. Méth.* 1807 which have been consulted. In these the "characteristic" nervures are indicated otherwise, viz. by dotted lines, and the Plate referred to by Panzer as the "Instructionstafel" is altogether uncoloured, as are those following until Plate 6.

§ Here Panzer accidentally misrepresents Jurine, who says quite correctly that the feature in question—a real but very inconspicuous one and generally ignored by describers—is found in the 1st *cubital* cell (not the *radial!*).

|| We understand Panzer to mean that the enlargements are made *correctly to scale* and to an extent convenient for practical use.

V) in 24 Compartments, but somewhat smaller ones, are shown just so many Wings or Genera with their Nomenclature.* One can now, if one has distinctly grasped the *Clavis methodi*, very easily guide oneself aright. But what tends above all to facilitate the Comprehension of this Method are the figures of Species on the Plates following (each with nine quadrangular Compartments) reproduced perfectly in gravure by the Master-hand of Citizen *Massol* from the incomparably accurate and beautiful Paintings of Hr. Prof. *Jurine*, in such manner that to each particular Genus there is assigned also one particular species.† Accordingly, not merely does each Compartment or Quadrangle contain the entire Insect complete, and, if needful, considerably enlarged also: but likewise apart from this an Antenna, often also one for both Sexes, as well as a Mandible much enlarged, accompanied by the Name of the Insect. In this Way it is made almost impossible to go wrong,‡ and if in one's own Investigations, it is desired to ascertain the Generic-rights, even of unpublished insects, by merely first consulting the Plates of Wings, one will be so put in the right way by help of these Generic Tafeln, that all error can in consequence be avoided with certainty.

Since the Characters of the Wings, Antennae, and Mandibles are *uniform* beyond all Expectation, the Genera themselves become extremely *natural:* the apparent,§ forced or artificial, ceases consequently by degrees to be

* If this account of the Plates is compared in detail with the actual Plates 1 to 5 of the *Nouvelle Méthode* as published it will be found that they agree exactly.

† The statements in this last sentence do not quite agree with what seem to be the facts of the case. On the (coloured) Plates VI and VII of the *Nouv. Méth.* as published, and also on all those following (except the last, which is unsigned and was evidently added later), appear the names of *Mlle.* (sic) *Jurine* as artist and *Gaister* (or ? *Gaisler*) as engraver. And it is stated by Klug (*Mon. Siric.*, p. 5, 1803) that Jurine's Figures were produced by his (Jurine's) daughter. We must leave these discrepancies of evidence as they stand. Possibly further facts may come to light which will account for them.

The words "to each particular Genus there is assigned also one particular species" deserve attention as indicating that the author had a more or less distinct conception of what are now called Genotypes—the fixation of a Genus by a species selected *ad hoc!*

‡ Panzer, however, did go wrong in certain cases when he tried to apply the Method himself.

§ We suppose this to mean "*merely* apparent"—(unreal or superficial ?).

artificial, and one then sees simply the Species actually combined by Nature into a single Association, arranged among themselves according to Rules so precise, that it is wonderful why one has not learnt them from Nature long ago.

To make Lovers of these Insects acquainted in advance with the *Genera* established by this Method, the latter shall be here not only communicated, but also placed over against the *Fabrician* genera published already, so that it will then be easy to compare these genera of Hr. Prof. *Jurine* with those of Hr. Prof. *Fabricius*, or, if it seem good, to combine them.

[Here follows the (Latin) Tabulation of the Genera, which need not be repeated, and the Article then proceeds as follows]—

From the above Parallels one can easily see, how the *Jurinean Genera* are related to the *Fabrician;* how very closely many of the former approximate to the latter; how *natural* too are many *Fabrician Genera*, not liable to be superseded even by the Employment of this novel Method; and yet that this Class of Insects was bound to profit * in its turn enormously thereby, since Hr. Prof. *Jurine*, as well as the Wings, took also into consideration those Parts, on whose Importance Hr. Prof. *Fabricius* insisted with such Acuteness of perception.

To say more of Hr. Prof. *Jurine's* Enterprise would be too much of a transgression over the Limits of a merely preliminary Announcement. Let the above Statement suffice, till this Work can tell its own Tale.

The following works will be continually referred to in our notes :—

Fabricius, J. C.—Ent. Systematica **2** (1793): Suppl. (1798)—Systema Piezatorum (1804).

Panzer, G. W. F.—Fauna Ins. Germaniae **1–9** (Heft **1–109**) (1793–1810)—[**73–80** (1800): **81–4** (*ante* 3. IX. 1801): **85** (1801): **86–96** (*ante* 1. X. 1804)].

Latreille, P. A.—Précis Caract. Insectes (1796)—Hist. Nat. des Fourmis (IV. 1802)—Nouv. Dict. Hist. Nat. **24** (1804)—Hist. Nat. Crust. Ins. **3** (V–IX. 1802): **13** (1804–5): **14** (1804–5)—Genera Crust. Ins. **3** (1807): **4** (1809)—Concid. Générales (1810).

Lamarck, J. M.—Système des Animaux sans Vertèbres (I. 1801).

Jurine, L., éd. Panzer, G. W.F.—Erlangen Litteratur—Zeitung **1**. 160 (23. V. 1801): 161–5 (30. V. 1801)—Jurine, L.—Nouvelle Méthode de classes les Hyménoptères (1807).

* Panzer means, no doubt, the *Study* of this Class of Insects, etc.

"Ordo I. Abdomine prorsus sessili" (Jrn. Erl. Litt-Ztg. **1.** 163 no. 1–11).

1.

I·1. **Tenthredo** (L.) Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 1 Tenthredo—Tenthredo : antennis clavatis."

[*i. e.* TENTHREDO L. Syst. Nat. (ed. **10**) **1.** 555–9 no. 214 sp. 1–40 (1758); F. Ent. Syst. **2.** pp. iv, 104–7 no. 138 sp. 1–11 (1793): Sppl. 214 (1798)—**lutea** L., *etc.*]

CIMBEX Olvr. (1790)

= *Tenthredo* (p.) L. (1758) Jrn.; = *Clavellarius* Olvr. (1789) *MN.*; = †*Clavellaria* (Olvr.) Lmk. (1801).

Type: **Tenthredo lutea** L. ([*Lmk. 1801*]; Ltr. 1802, 1804, 1810).

Cimbex Olvr. [= *Clavellarius* Olvr. Enc. Meth. HN. **4.** (Ins. **1**) 22 no. 33 (1789) *MN.*]. Cimbex Olvr. Enc. Meth. HN. **5.** (Ins. **2**) 760–72 sp. 1–16 (1790)—[sixteen species including **lutea** L.]: **6.** (Ins. **3**) 18 (1791); Ltr. Préc. Car. Ins. 107–8 no. 4 (1796). †*Clavellaria* Lmk. Syst. An. sans Vert. 264 no. 116 (1801)—[Type: **lutea** L.]. **Tenthredo* Jrn. Erl. Litt-Ztg. **1.** 163 no. 1 (1801). Cimbex Ltr. HN. Crust-Ins. **3.** 300 (1802)—[Type **lutea** L.]: **13.** 119–23 no. 325 sp. 1–11 Pf. 99·1 (1804–5): Nouv. Dict. HN. **24.** 172, 199 no. 370 (1804); F. Syst. Piez. pp. vii, 15–18 no. 1 sp. 1–12 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 15 (1806). **Tenthredo* Jrn. Nouv. Méth. Hym. 45–8 no. 1 Pf. 2·1, 6·1 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 390 (1882). Cimbex Ltr. Gn. Crust-Ins. **3.** 225–8 no. 425 (1807): Cons-Gén. Crust-Ins. 293, 435 no. 380 (1810); Crt. Br. Ent. **1.** expl. Pl. **41** (1824); Wstwd. Syn. Gn. Br. Ins. 51 (1840); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20.** 77, 95 (1911).

[Olivier substituted *Cimbex* in lieu of *Clavellarius* Olvr. *MN.*, considering the latter too close to Clavaria (Botany)].

[*nec* **Clavellaria* (Lmk.) Crt. Br. Ent. **2.** expl. Pl. **93** (1825)—*amerinae* L. (**Pseudoclavellaria** Schulz)].

Jurine intended to apply the name *Tenthredo* L. to the species included by that author and Fabricius in the group "*Antennis clavatis.*" That group had at an earlier date (1790) been separated from *Tenthredo* by Olivier under the name *Cimbex*, the author at the same time withdrawing a name (*Clavellarius*) which he had suggested, but without including in it any species, in the previous year.

The Type of *Cimbex* Olvr. (= *Tenthredo* Jrn.) is **lutea** L., which was designated by Latreille in "An. X" (*i. e.* between 22 Septr. 1801 and 21 Septr. 1802), and again in 1804, and 1810.

Already, in 1789, Thünberg had recognised that some distinction might be drawn between such species as *lutea* L., *obscura* L., etc. (*i. e.* the group with clavate antennae),

and suggested the introduction of a new genus *Corynis* (κορύνη = a club).

This appears to be a valid publication of a new generic name, and therefore either *Cimbex* Olvr. or *Amasis* Leach must sink as a synonym of *Corynis* Thnbg.; the latter (viz. *Amasis*) can be the better spared, and we propose therefore to designate **obscura** L. as the Type of *Corynis* Thnbg. (1789) = *Amasis* Leach (1817).

Corynis Thnbg. (1789)

n.syn. = *Amasis* Leach. (1817).

Type: **Tenthredo obscura** L. (M. & D. 1915).

Corynis Thnbg. Peric. Ent. Char. Gn. Ins. p. 13 (1789): Diss. Ac. **3**. 260 (1801).

"*Corynis* h). Antennae capitatae. Abdomen fornicatum." "h) Sub hac denominatione innuimus *Tenthredinem luteam obscuram*, & hisce similes, quae alias iisdem notis insigniuntur, ac Genus insequens, *Tenthredo*."

[This generic name is omitted from Rohwer's list.]

2.

I·2. **Cryptus** Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 2 Cryptus—Tenthredo antennis inarticulatis."

[*i. e.* TENTHREDO L. Syst. Nat. (ed. **10**) **1**. 555–9 no. 214 sp. 1–40 (1758): F. Ent. Syst. **2**. 108–10 no. 138 sp. 12–22 (1793)—**rosae** L.; *coerulescens* F.; *etc.*].

TENTHREDO L. (1758)

= †*Tentredo* Lmk. (1801), †*Thenthredo* Ltr. (1810); = *Cryptus* Jrn. (1801), †*Cruptus* Jrn. (1807); = *Hylotoma* Ltr. (1802); = Arge Schrk. (1802).

Type 1: **Tenthredo rosae** L. (Lmk. 1801).

Tenthredo L. [Fn. Suec. (ed. **1**) 282–9 sp. 923–50 (1746) *MN.*]: Syst. Nat. (ed. **10**) **1**. 343 no. 213, 555–9 no. 214 sp. 1–40 (1758)—[2. *lutea* L.; 12 *scrophulariae* L.; 21 **rosae** L.; *etc.*]: Fn. Suec. (ed. **2**) 388–95 sp. 1533–72 (1761); Poda Ins. Mus. Graec. 102–3 sp. 1–6 (1761) [*nitens* L.; **rosae** L.]; Slzr. Knnz. Ins. 141–3 no. 44 Pf. **18**·109–13 (1761); Gffr. Hist. Ins. **2**. 266–89 sp. 1–38 (1762); Scp. Ent. Carn. 274–81 sp. 719–38 (1763); Müller Fn. Ins. Fridrichs. pp. xxi, 69–70 no. 44 sp. 599–612 (1764); L. Syst Nat. (ed. **12**) 1 (2). 359, 920–8 no. 242 sp. 1–55 (1767); Brkht. NH. Gt. Brit. **1**. 162–3 (1769); Frstr. Nov. Sp. Ins. Cent. **1**. pp. viii, 78–80 sp. 78–80 (1771); Scp. Ann. HN. **5**. 120–1 sp. 142–3 (1772); Yeats Inst. Ent. 173–8 (1773); Müller L. Syst. Nat. **5** (2), 819–36 no. 242 sp. 1–55 (1775); Schrk. Beytr. Naturges 83–6 sp. 41–7 (1776); F. Gn. Ins. 112 no. 105 (1777); Blmbch. HB. Naturges. **1**. 378 (1779); F. Sp. Ins. **1**. 405–17 no. 108 sp. 1–61 (1781); Schrk. Enum. Ins. Austr. 322–43 sp. 648–93

(1781); Retz. De Geer Gn. et Sp. Ins. 71–4 no. 22 sp. 293–323 (1783); Leske Anfang. Naturges. 518–19 no. 54 (1784); Schmiedl. Einl. Kennt. Ins. 354–60 (1786); F. Mant. Ins. 1. 252–6 no. 112 sp. 1–64 (1787); Gmel. L. Syst. Nat. (ed. 13) 1 (5) 2653–71 no. 242 sp. 1–36, 38–66, 66–122, 122–6, 128–42 (1788); de Vill. Ent. Fn. Suec. 3. 78–126 no. 2 sp. 1–138 (1789); Brahm Ins-Kal. 1. pp. lxxix–lxxx (1790); Petagna Inst. Ent. 1. 345–53 no. 111 sp. 1–32 (1792); Pzr. Fn. Ins. Germ. 5·21, 7·9 (1793): 17·14–17 (1794): 26·20–1 (1796): 45·13, 46·1 (1797): 49·12–18, 52·2–14 (1798): 62·6–11, 64·1–11, 65·1–11, 71·6–10, 72·1–2 (1799): 76·11 (1801): 81·10–12 (1801): 82·10–13, 84·11–13 (1801): 88·17 (1804): 98·9–13, 100·10, 105·14, 107·6–7 (1809); F. Ent. Syst. 2. pp. iv. 104–23 no. 138 sp. 1–78 (1793); Forst. Enchirid. NH. 154 no. 60 (1794); F. Sppl. Ent. Syst. 214–8 (1798); Cuvr. Tbl. Element. HN. An. 503–5 (1798); Cdrhlm. Fr. Ins. Prodr. Petrop. 145–53 no. 81 sp. 443–71 (1798). †*Tentredo* Lmk. Syst. An. sans Vert. 263 no. 115 (I. 1801)—[Type **rosae** L.]. *Cryptus* Jrn. Erl. Litt-Ztg. 1. 163 no. 2 (V. 1801). *Hylotoma* Ltr. HN. Crust-Ins. 3. 302 (1802)—[Type: **rosae** L., F.]: 13. 133–5 no. 327 sp. 1–8 Pf. 99·2 (1804–5): Nouv. Dict. HN. 24. Tbl. Meth. 172–3, 199 no. 371 (1804). Tenthredo Trtn. Syst. Nat. 3. 411–26 no. 82 (1802); Schrk. Fn. Boica 2 (2) 209, 230–52 no. 232 sp. 1993–2039 (1802); Pzr. Krit. Rev. Ins-Deutsch. 2. 15–53 (1806). *Cryptus* Jrn. Nouv. Méth. Hym. 49–51 no. 2.(†*Cruptus*) Pf. 2·2, 6·2 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. 6. 390 (1882). *Hylotoma* Rwr. US. Dp. Agr. (Ent.) Tech. Ser. 20. 81, 97 (1911).

Type 2:—**Tenthredo coerulescens** F. (Ltr. 1810).

Hylotoma* Ltr. Cons-Gén. Crust-Ins. 293–4, 435 no. 381 (1810)—[Type: **coerulescens F.]; Crt. Br. Ent. 2. expl. Pl. 65 (1825).

[*Hylotoma* Ltr. (1802) was a monotypical genus founded on **rosae** L., F.].

Type 3: **Cryptus segmentarius** Pzr. 88·17 (Rwr. 1911).

Cryptus* Pzr. Fn. Ins. Germ. 88·17 (1804)—[1. *enodis* L.; 2 **segmentarius Pzr.]: 102·15–16 (1809): 109·8–10 (1810); Rwr. Ent. News 22. 219 (1911)—[Type: **segmentarius** Pzr.].

Type 4: **Tenthredo dimidiata** F. (Crt. 1838).

Tenthredo* (L.) Crt. Br. Ent. 15 expl. Pl. 692 (1838)—[Type: **dimidiata F.]

[Curtis cites *dimidiata* F. as Type—this was not one of Linné's exponents of *Tenthredo I*]

[*nec* **Tenthredo* (L.) Jrn. Erl. Litt-Ztg. 1. 163 no. 1 (1801): Nouv. Méth. Hym. 45–8 no. 1 Pf. 2·1, 6·1 (1807)—*lutea* L. (Cimbex Olvr.)].

[*nec* **Tenthredo* (L.) Ltr. HN. Crust-Ins. 3. 300–2 (1802): 13. 123–33 no. 326 sp. 1–43 (1804–5): Gn. Crust-Ins. 3. 228–31 no. 426 (1807): Cons-Gén. Crust-Ins. 294. (†*Thenthredo*) 435 no. 382 (1810); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. 20. 90, 97 (1911)—*scrophulariae* L. (Allantus Jrn.)].

[*nec* **Cryptus* (Jrn.) Crt. Br. Ent. 2. expl. Pl. 58 (1825): Rwr. US. Dp. Agr. (Ent.) Tech. Ser. 20. 77, 94 (1911)—*furcata* Vill. (Schizocera Lep.)].

[*nec* *§*Cryptus* F. Syst. Piez. pp. ix, 70–92 no. 10 sp. 1–103 (1804); Crt. Br. Ent. **14**. expl. Pl. **668** (1837); Vrck. Bull. US. Nat. Mus. **83**. 38, 185 (1914)—Type: *viduatorius* F. (Genus?)].

The name *Cryptus* Jrn. was first applied to the second Fabrician section of *Tenthredo* L., viz., "*Antennis inarticulatis*"—five of its species however do not possess this character and cannot therefore be types of *Cryptus* Jrn. In the Nouv. Méth. Hym. Jurine omits these, as also two other species which are South American.

But, before Jurine's *Cryptus* was published, Lamarck, in the month "Pluviose An. IX" (= January 1801), had already selected a species of this group as the Type of *Tenthredo* L.—*Cryptus* Jrn. can therefore only be regarded as a synonym of *Tenthredo* L., as defined by Lamarck. Although itself a synonym, the publication of this name *Cryptus*, in 1801, makes illegal the action of Fabricius in applying (Syst. Piez. 1804) the same name to a totally different group of *Hymenoptera*.

Cryptus F. (1804) is therefore a homonym of *Cryptus* Jrn. (1801) and the nomenclature of the *Ichneumonidae* will require considerable revision in consequence.

Jurine proposes to restrict *Tenthredo* to the section "*Antennis clavatis*," but Lamarck had already (January 1801) cited as Type for *Tenthredo* a species not belonging to that group, viz. *rosae* L.,F. What was this *rosae*? There is strong reason to think that Linné confused under the name *rosae* two, if not more, quite different insects, viz. Réaumur's "Saw-fly of the Rose," in which the antennae are *not* clavate, but inarticulate ("*exarticulatis*"), and *Athalia rosae* Auctt., in which also the antennae are *not* clavate, but 9 to 10-jointed ("*septemnodiis*" in Linné's classification).

In the Systema Naturae (editions **10**, and **12**), and also in Fauna Suecica, Linné describes his species as having seven-jointed antennae, and at Burlington House the only specimen ticketed in Linné's own hand as "*rosae*," with a reference to the 10th edition, is a specimen of *Athalia rosae* Auctt., but with this insect are placed, without labels, specimens of Réaumur's species, and the well-known passages and figures of Réaumur, etc., are referred to by Linné himself in his synonymy.

Authors (*e. g.* von Dalla Torre, in his Catalogue) frequently recognise both an *Athalia rosae* L. and a *Hylotoma rosae* L., which, as shown by their references to Syst. Nat.,

etc., are both founded on the "*Tenthredo rosae*" of Linné. This being a composite species a choice must be made between the two insects, indicated on the one hand by Linné's expression "*antennis septemnodiis,*" with which a specimen in his collection agrees, and, on the other hand, by Linné's citation of Réaumur's species and his adoption in a Latinised form of Réaumur's vernacular name. Réaumur's insect *is* attached to the Rose, the *Athalia* is *not*, so the name *rosae* should be restricted to Réaumur's species, which, by the way, is congeneric with that selected by Curtis as the Type in 1838 (viz. *dimidiata* F.), which, however, is not one of Linné's original types.

Lamarck describes the antennae simply as "*filiformes,*" which tells us nothing, but there can be no doubt that in his view *Tenthredo rosae* L. meant Réaumur's well-known insect, the "Saw-fly of the Rose," and this selection of a Type, whatever may be the consequences, was apparently legitimate and irrevocable. *Tenthredo* Jurine is therefore a homonym of *Tenthredo* L. (*see* Lamarck), and the group "*antennis clavatis*" cannot be so called. Lamarck's selection of "*Tenthredo rosae* L.,F." (*i. e.* of Réaumur's "Saw-fly of the Rose") as the Type of *Tenthredo* reduces not only *Cryptus* Jurine, but also *Arge* Schrank, and *Hylotoma* Ltr. to synonyms of that genus.

Other species have been suggested by other authors as types of *Tenthredo*, e.g. *dimidiata* F., by Curtis (1838), which, though congeneric with *rosae* L. is not a Linnéan species and cannot be Type of a Linnéan genus.

Latreille's designation (1810) of *scrophulariae* L., which is accepted by Mr. Rohwer, is anticipated by Lamarck's selection of *rosae* L. in January 1801 (*scrophulariae* L. is the Type of the next Jurinean genus, viz. *Allantus*).

3.

I·3. **Allantus** Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 3 Allantus—Tenthredo: Scrophul. viridis, etc."

ALLANTUS Jrn. (1801)

= * *Tenthredo* (L.) Ltr.

Type: **Tenthredo scrophulariae** L. (Crt. 1839).

Allantus Jrn. Erl. Litt-Ztg. 163 no. 3 (V.1801)—[1. **scrophulariae** L.; 2. *viridis* L.; *etc.*]; Pzr. Fn. Ins. Germ. 88·18, 90·9, 91·13–19 (1804): Krit. Rev. Ins. Deutsch. 10, 15 25–40 (1806)· Jrn. Nouv.

Méth. Hym. 52–6 no. 3 Pf. 2·3, 6·3 (1807); F–G. K. & K. MT. Schweiz. Ent. Ges. 6. 390 (1882). **Tenthredo* Ltr. Cons. Gén. Crust-Ins. 294. (†*Threnthredo*) 435 no. 382 (1810)—[Type: **scrophulariae** L.]. Allantus Crt. Br. Ent. **16**. expl. Pl. **764** (1839)—[Type: **scrophulariae** L.]; Wstwd. Syn. Gn. Br. Ins. 52 (1840); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 73, 97 (1911).

[*nec* * *Allantus* Pzr. Fn. Ins. Germ. **82**·12 (VII. 1801); Rwr. Ent. News **22**. 73 (1911)—*togata* Pzr. (Emphytus Klug)].

The Erlangen List (1801) enumerates under *Allantus* only two species, and one of these, *scrophulariae* L. was designated by Curtis (1839) as the Type of *Allantus*. Latreille (1802) whom Rohwer (1911) follows, cited this species as Type of *Tenthredo* L. (see preceding note, p. 373), but as *Tenthredo* L. had been previously furnished by Lamarck with *rosae* L. as its Type (I. 1801), Latreille's action was invalid and Curtis' selection should be accepted.

Panzer in September 1801 (Fn. Ins. Germ. **82**·12) figures a "*Tenthredo togata* Fabricius," adding in the synonymy, but not on the plate,

> "*Tenthredo togata*. *Fabric.* inedit.
> *Allantus* Iurine.
> Legi saepius in dumetis."

Fabricius in 1804 (Syst. Piez. 32) describes a *Tenthredo togata*, adding "Habitat in Germania Dr. Panzer." In his diagnosis he describes a spot on the first segment, and the whole fifth segment of the abdomen as *red*.* In the description he says that a spot on the first segment, and the whole fifth segment are *white*—Panzer's figure shows no red on the body at all. The diagnosis clearly does not refer to the species taken "*in dumetis*" and figured by Panzer—the description however seems to do so.

Rohwer [Ent. News **22** p. 218 (1911)] makes "*Tenthredo* (*Allantus*) *togata* Panzer" (*sic*) Type of *Allantus*, accrediting this genus to Panzer, not Jurine, and calling it "monobasic"—but *Allantus* Jurine, May 1801, has precedence over "*Allantus* Jurine" Panzer, July–Septr. 1801—and *togata* was not included among Jurine's types; nor do its characters agree with those of the other insects figured and described as *Allantus* by Panzer in Fn. Ins. Germ., and in the Krit. Rev., so that evidently Panzer's reference of *togata* to *Allantus* Jrn. was a mere mistake.

* In Fallén's copy of the Syst. Piez., which is in the Ent. Soc. Library, "*rufis*" is corrected to "*albis*."

Tenthredo togata Pzr. (**82**·12) belongs really to the second division of Jurine's *Dolerus*, and this division was raised into a new genus, *Emphytus*, by Klug in 1813 (Type: *cincta* L.; Crt. 1833)—this name should therefore be restored.

Panzer reconsidered this question, in Krit. Rev. Ins. Deutsch., and included *togata* among the *Doleri* of Jurine, saying that it is very like *cincta*, which is the species figured by Jurine to illustrate *Dolerus*, second family [= *Emphytus* Klug].

In Nouv. Méth. Hym. (p. 58) Jurine also includes *togatus* Fabr., Panzer, in *Dolerus*, second family, but doubtfully, saying that he does not possess the species, and that if it belongs to this genus the cubital cells are not drawn correctly.

The above facts seem to necessitate: (1) the attribution of the genus *Allantus* to Jurine (Erlangen List, 1801), and not to Panzer (Fn. Ins. Germ.); (2) the rejection of *togata* Pzr. (and equally of *togata* F.) as a possible type for *Allantus*; and, (3) the retention of *Emphytus* Klug (Type: *cinctus* L.) as a properly applied name for the second family of Jurine's heterotypical genus *Dolerus*.

In 1911, Rohwer accepted Latreille's designation (1802) of *gonager* F. as the Type of *Dolerus* Jrn., but later in the same year (Ent. News **22**. 219) he withdrew this, accrediting *Dolerus* to Panzer, and treating it as a monotypical genus with Type *pedestris* Pzr. This view we must reject, for *pedestris* Pzr. is not one of the species included in *Dolerus* of the Erlangen List—this was published in May 1801, while Panzer's figure appeared later in the year (before September).

4.

I·4. **Dolerus** Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 4 Dolerus—Tenthredo germanica, gonagra, etc."

DOLERUS Jrn. (1801)

Type 1: **Tenthredo gonagra** F. (= *gonager* Jr.; Ltr. 1810).

Dolerus Jrn. Erl. Litt-Ztg. **1**. 163 no. 4 (30. V. 1801)—[1. *germanica* F.; 2. **gonagra** F.; *etc.*]; Pzr. Fn. Ins. Germ. **82**·12 (VII. 1801): Krit. Rev. Ins. Deutsch. **2**. 10, 15. 40–4 (1806); Jrn. Nouv. Méth. Hym. 57–8 no. 4 Pf. 2·4, 6·4 (1807); F-G. K. & K. MT. Schweiz Ent. Ges. **6**. 390 (1882); Ltr. Cons-Gén. Crust-Ins. 294, 435 no. 383 (1810)—[Type: **gonager** Jrn.]; Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 78, 94 (1911).

Type 2: **Tenthredo pratensis** L. (= *pedestris* Pzr. 82·11 ; Rwr. 1911).

* *Dolerus* Pzr. Fn. Ins. Germ. 82·11 (VII. 1801); Rwr. Ent. News. 22. 219 (1911)—[Type: **pratensis** L. (= *pedestris* Pzr.).

Latreille, in 1810, cited *gonager* Jrn. as the Type of *Dolerus* Jrn., and Rohwer accepted this species as the Type of *Dolerus* Pzr. (Krit. Rev., 1806) in his Genotypes of the Sawflies (1911); later in the same year, however, Mr. Rohwer (Ent. News **22**. 219) traced the genus back to 1801 (Panzer, Fn. Ins. Germ.) and designated *pratensis* L. (= *pedestris* Pzr. 82·11) as the Type. Jahrgang **7** of the Fauna Ins. Germ. is dated 3 September, 1801, but we now know that *Dolerus* Jurine was first published in the Erlangen List, 30 May 1801. Latreille's citation of *Tenthredo gonagra* F. will therefore remain valid.

5.

I·5. **Nematus** Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 5 Nematus—Tenthredo capreae, septentrionalis, etc."

NEMATUS Jrn. (1801)

= *Croesus* Leach (1817).

Type: **Tenthredo septentrionalis** L. (Ltr. 1810).

Nematus Jrn. Erl. Litt-Ztg. **1**. 163 no. 5 (30. V. 1801) [1. *capreae* L., F.; 2. **septentrionalis** L.]; Pzr. Fn. Ins. Germ. [82·10 (VII. 1801)]: 90·10–11 (1804): Krit. Rev. Ins. Deutsch. **2**. 10, 15, 44–6 (1806); Jrn. Nouv. Méth. Hym. 59–60 no. 5 Pf. 2·5, 6·5 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 390 (1882); Ltr. Cons. Gén. Crust-Ins. 294, 435 no. 384 (1810)—[Type: **septentrionalis** F., Jrn.]; Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 84, 97, 99 (1911).

[*nec* * *Nematus* (Pzr.) Rwr. Ent. News **22**. 219 (1911)—*lucida* Pzr. (**Holcocneme** Knw.)].

Latreille cited *septentrionalis* L. as the Type of *Nematus*. This is a well-identified species, and being one of the original types of the Erlangen List should be accepted.

Rohwer [US. Dp. Agr. (Ent.) Tech. Ser. **20**. 84, 97, 99 (1911)] adopted Latreille's designation of *septentrionalis* L. as the Type of *Nematus* Pzr., but later [Ent. News **22**. 219 (1911)] retracts this and makes *Tenthredo lucida* Pzr. [Fn. Ins. Germ. 82·10 (VII. 1801)] the Type of the "monobasic" genus *Nematus* Pzr., sinking accordingly *Holcocneme* Knw. (whose Type *crassa* Fallén is congeneric with *lucida* Pzr.) as = *Nematus* Pzr., but this figure was published subsequently to the appearance of the Erlangen List (30. V. 1801), and *lucida* is not one of Jurine's original types

—*Holcocneme* Knw. may therefore still be used for the group which includes *lucida* Pzr. and *crassa* Fallén.

Croesus Leach, with Type *septentrionalis* L. [cited by Rohwer US. Dp. Agr. (Ent.) Tech. Ser. **20**. 77, 97, 99 (1911)] must therefore sink as synonymous with *Nematus* Jrn.—**Nematus* Knw. is a different genus, and has accordingly been renamed by Rohwer *Nematinus*, with Type *abdominalis* Pzr.

[The second *Nematus* of the Erlangen List is *capreae*. In Systema Naturae (ed. **10**) we find Linné describing a larva as *capreae*, saying that he did not know the imago; in the **12**th edition Linné repeats his description and adds a reference to *Tenthredo salicis* Fn. Suec. 1752. This *Tenthredo salicis* we now find is the well-known and very remarkably coloured larva of a very common *Pteronidea*, which has been admirably figured, together with its imago, by Goedart, and these figures, and also others representing the same species in other works, are referred to in the synonymy of the Fauna. Now, reverting to the **10**th edition, we find an imago described as *salicis*, evidently the imago of the same species, and here again Goedart's and the other figures are referred to; the imago is no doubt the species universally known as *T. salicis* L., this is attached to *Salix*, and has the character mentioned by Linné of a black stigma, which is exceptional in *Pteronidea*. We infer from these facts that *capreae* L. is a synonym of *salicis* L., and that the *Pachynematus* referred by many authors to **capreae* L. (=*trisignatus* Forst.), chiefly on the authority of a figure in Panzer, is a different species. Panzer's figure (**65**·8), from its very short antennae and other characters, appears to represent, not a *Pachynematus* Knw., nor a *Pteronidea* Rwr., but an *Amauronematus* Knw. (perhaps *A. vittatus* Lep.). The mistake appears to have been partly due to the omission by Linné (in ed. **12**) to repeat his remark as to the black stigma. Fabricius and Gmelin, under *capreae*, describe an imago with pale stigma, particoloured mesonotum, and other characters which agree with Panzer's figure, but are quite inconsistent with Linné's own account of *salicis*. Also, the true *salicis* is attached to *Salix*, but Fabricius and Gmelin add a statement that this larva devastates the Red Currant (apparently confusing it with *ribesii*, or some such species.

The *capreae* of Cameron, etc., feeds on sedge and grasses, and naturally it has never been suggested that this form has anything to do with *T. salicis* L.]

6.

1·6. PTERONUS Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 6 Pteronus—Tenthredo : antennis pectinatis."

[*i.e.* TENTHREDO F. Ent. Syst. **2**. 111–12 sp. 23–8 (1793): Sppl. Ent. Syst. 214–5 (1798)—**pini** L., *etc.*]

PTERONUS Jrn. (1801)

= *DIPRION* Schrk. (1802); = § *LOPHYRUS* Ltr. (1802); = *ANACHORETA* Gistel. (1848); = *CRISTIGER* Gistel. (1848).

Type: **Tenthredo pini** L. (Pzr. 1804; Ltr. 1802; Rwr. 1911).

PTERONUS Jrn. Erl. Litt-Ztg. **1**. 163 no. 6 (V. 1801). § *LOPHYRUS* Ltr. HN. Crust-Ins. **3**. 302 (1802)—[Type: **pini** L.]: **13**. 135–7 no. 328 sp. 1–4 (1804–5): Nouv. Dict. HN. **24**. 173, 199 no. 372 (1804): Gn. Crust-Ins. **3**. 232 no. 428 (1807): Cons-Gén. Crust-Ins. 295, 435 no. 387 (1810). *DIPRION* Schrk. Fn. Boica **2** (2). 209, 252–4 no. 233 sp. 2040–2 (1802). PTERONUS Pzr. Fn. Ins. Germ. **87**·17 (1804)—[Type: **pini** Pzr.]: Krit. Rev. Ins. Deutsch. **2**. 10, 15, 46–8 (1806); Jrn. Nouv. Méth. Hym. **61**–4 no. 6 Pf. 2·6, 6·6 (1807); F-G. K & K. MT. Schweiz. Ent. Ges. **6**. 390 (1882). *DIPRION* Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 78, 82, 88, 96, 98 (1911)—[Type: **pini** L.]. PTERONUS Rwr. Ent. News **22**. 219 (1911).

[§ *Lophyrus* Ltr. is homonymous with **LOPHYRUS** Poli (1791) *Moll.*]

Pteronus Jrn. in the Erlangen List is defined as the equivalent of Fabricius' third section of *Tenthredo* (*Antennis pectinatis*). That division includes nominally four (really three) species of the genus commonly called *Lophyrus* Ltr. [this name however is preoccupied in *Mollusca* by Poli (1791)]—one *Monoctenus*, and one *Megalodontes*, to these, in the Supplement, Fabricius adds another, *furcata* Vill., but Panzer (Krit. Rev., 1806) states that the peculiar structure of the antennae in *furcata* ♂ is not a real pectination, and that they are ciliated as in *ustulata* and *enodis* (*i. e.* as in *Tenthredo* L. as employed in these notes), and in fact, *furcata* is much nearer to *rosae* L. than to any species of the group under consideration. The commonest and best-known of the possible types is *pini* L., and this species, together with two others (also possible types, but not congeneric with it), have been called by Schrank *Diprion*, which name Rohwer has adopted with Type *pini* L.,

sinking *Pteronus* Pzr. as a synonym of it. *Pteronus* Jrn., however, has precedence by a year over *Diprion* Schrank, and the former name with Type *pini* L., designated by Rohwer, should be restored. *Pteronus* Knw., founded on Jurine's third family of *Pteronus* in the Nouv. Méth. Hym., which would not be a *Pteronus* according to the Erlangen List, becomes a homonym and is to be replaced by *Pteronidea* Rwr. (1911).

7.

I·7. CEPHALCIA Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 7 Cephalcia—Tenthredo : antennis multiarticul."

[*i.e.* TENTHREDO F. Ent. Syst. **2**. 121–3 sp. 66-78 (1793): Sppl. Ent. Syst. 218 (1798)—**signata** F., *etc.* Jurine included under "*Cephalcia*" Fabricius' sixth section "*Antennis filiformibus: articulis plurimis*"—each species in this section is described by Fabricius as "*Tenthredo antennis multiarticulatis.*"]

CEPHALEIA Jrn. (1801)

† *CEPHALCIA* Jrn. (1801), ‡ CEPHALEIA Pzr. (1806), Jrn. (1807).

Type : **Tenthredo signata** F. (Rwr. 1911).

CEPHALEIA Jrn. = † *CEPHALCIA* Jrn. Erl. Litt-Ztg. **1**. 163 no. 7 (V. 1801); Pzr. Fn. Ins. Germ. **86**·8–9, **87**·18 (1804). CEPHALEIA Pzr. Krit. Rev. Ins. Deutsch. **2**. 10, 15, 48–50 (1806); Jrn. Nouv. Méth. Hym. 65–7 no. 7 Pf. **2**·7, **7**.7 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 390 (1882); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 76, 97 (1911)—[Type : **signata** F.]. † *CEPHALCIA* Rwr. Ent. News **22**. 218 (1911).

"*Cephalcia*" in the Erlangen List must be a mere misprint, for on two of the Plates (Pl. **2** and **7** no. 7) which were seen by Panzer, and are described correctly as to all details in his paper, the word is engraved *Cephaleia*. Panzer afterwards repeated the mistake three times in the Fauna Germanica (**86**·8, **86**·9, and **87**·18), but in the Kritisch Revision he restored the spelling *Cephaleia*, printing the *e* in a somewhat larger type than the other letters of the word—evidently therefore intending to correct his former spelling. Jurine himself throughout the Nouvelle Méthode, both in the text and on the plates, invariably writes *Cephaleia*. This name one cannot doubt was meant to be derived from *κεφαλή*, and if so, such a form as *Cephalcia* is an absolute impossibility. *Cephaleia* is not irreproachable, but the objections to it are not so obvious,

and Jurine, who was at most only a fair classical scholar, may have failed to recognise them.

Rohwer in 1911 cited *signata* F. as the Type of *Cephaleia* Pzr., and since Panzer attributes this genus to Jurine, we may take the citation as applying also to *Cephaleia* (†*Cephalcia*) Jrn.

8.

I·8. Oryssus (F.) Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 8 Oryssus—Oryssus Supplem."

[*i. e.* ORYSSUS F. Sppl. Ent. Syst. 209, 218–9 sp. 1–2 (1798)—**abietina** Scp. (= *vespertilio* F.; = *coronatus* F.)].

ORYSSUS F. (1798)

= †*Orussus* Ltr. (1796) *MN.*

Type: **Sphex abietina** Scp. (= *vespertilio* F.; = *coronatus* F.; F. 1798).

Oryssus F. [= *Orussus* Ltr. Préc. Car. Ins. 111 no. 10 (1796) *MN.*]. Oryssus F. Sppl. Ent. Syst. 209, 218–9 sp. 1–2 (1798)—[Type: **abietina** Scp. (= 1. *coronatus* F.; = 2. *vespertilio* F.)] Lmk. Syst. An. sans Vert. 264–5 no. 118 (I. 1801); Jrn. Erl. Litt-Ztg. **1**. 163 no. 8 (V. 1801); Ltr. HN. Crust-Ins. **3**. 305 (1802): **13**. 157–60 no. 334 sp. 1 (1804–5); Klug Mon. Siric. Germ. 1–8 Pf. 1·1–3, 8·1–8 (1803); Ltr. Nouv. Dict. HN. **24**. 173 no. 378 (1804); F Syst. Piez. pp. viii., 47 no. 6 sp. 1 Ind. 21 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 54 (1806); Jrn. Nouv. Méth. Hym. 68–9 no. 8 [† *Orussus*] Pf. 2·8, 7·8 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 390 (1882); Ltr. Gn. Crust-Ins. **3**. 245–9 no. 434 (1807); Cons-Gén. Crust-Ins. 296, 436 no. 392 (1810); Crt. Br. Ent. **10** expl. Pl. **460** (1833); Wstwd. Syn. Gn. Br. Ins. 55 (1840); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 85, 93 (1911).

This genus was proposed by Fabricius, in 1798, for two supposed species *coronatus* F. and *vespertilio* F., but as these are both identical with *abietina* Scp. the genus was monotypical in its inception. Latreille had previously published *Orussus*, in 1786, but without exponents—on the Plates of the Nouvelle Méthode the name also appears as *Orussus*, but this was corrected to *Oryssus* in the text, as also in the Erlangen List—this suggests that Jurine's plates were engraved before the publication of Fabricius' Ent. Syst. (1798) in which the name first appeared as *Oryssus*.

9.

I·9. Astatus Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 9 Astatus—Sirex pygmaeus. Banchus spinipes Panzer (Banchus viridator Fabric. inedit.)."

ASTATUS Jrn. (1801)

= *Cephus* Ltr. (1802); = *Trachelus* Jrn. (nn. 1807).

Type: **Sirex pygmaeus** L. (Jrn.; = *spinipes* Pzr.; Jrn. 1801; Ltr. 1810).

Astatus Jrn. Erl. Litt-Ztg. **1.** 163 no. 9 (30. V. 1801)—[Type: **pygmaeus** L. (= *spinipes* Pzr.; = *viridator* F., *LN.*)]; Pzr. Fn. Ins. Germ. **83**·12 (1801): 85·10–11 (1804). *Cephus* Ltr. HN. Crust-Ins. **3.** 303 (1802)—[Type: **pygmaeus** L.]: **13.** 141–5 no. 331 sp. 1–4 Pf. 99·3 (1804–5). Astatus Klug Mon. Siric. Germ. 45–56 sp. 1–8 Pf. 7·1–3, 8·26–30 (1803). *Cephus* Ltr. Nouv. Dict. HN. **24** Tbl. Méth. 173, 199 no. 375 (1804); F. Syst. Piez. pp. vii, 250–2 no. 47 p. 1–6 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 143–5 (1806) [= *Trachelus* Jrn.]. *Trachelus* Jrn. Nouv. Méth. Hym. 70–2 no. 9 Pf 2·9, 7·9 [nn. = *Astatus* Jrn.—(Type: **pygmaeus** L.)]; F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 391 (1882). *Cephus* Ltr. Cons-Gén. Crust-Ins. 296, 435 no. 390 (1810); Crt. Br. Ent. **7.** expl. Pl. **301** (1830); Wstwd. Syn. Gn. Br. Ins. 55 (1840); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20.** 76, 96 (1911).

[*nec* **Astata* Ltr. [Préc. Car. Ins. p. xiii., (*Astatus*) 114–5 no. 14 (1796) *MNN.*] HN. Crust-Ins. **3.** 336–7 (1802) **13.** 297 no. 394 sp. 1 (1804–5); Ltr. Gn. Crust-Ins. **4.** 67–9 no. 490 (1809); Cons-Gén. Crust-Ins. 322, 438 no. 480 (1810)—Type: **boops** Schrk. (= *abdominalis* Ltr.) (**Dimorpha** Ltr.)].

[*nec* * *Astatus* Pzr. Fn. Ins. Germ. **83**·12 (VII. 1801)—[*troglodyta* F.]: 85·11–12 (1801); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20.** 74, 79, 97 (1911): Ent. News **22.** 218 (1911)—Type: *troglodyta* F. (**Eumetabolus** Schulz)].

[*nec* * *Trachelus* (Jrn.) Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20.** 91 97, (1911)—Type: *tabidus* F. (= **Trachelastatus** nn.)].

[*nec* **Cepha* Blbg. Enum. Ins. Blbg. 98 (1820); Rwr. Ent. News **22.** 218 (1911)—Type: *tabida* F. († *tibida* Rwr.) (**Trachelastatus** nn.)].

Latreille (Préc. Car. Ins. p. xiii) proposed the name *Astata* for a genus which he promised to describe later, stating, at the same time, that he had intended to call it *Astatus*, but wished not to do so to avoid confusion with his genus *Astacus* (*Crust.*)—in the body of the work (p. 114–5) the genus is described as *Astatus*.

Having no exponents *Astata* (*Astatus*) Ltr. had no scientific status until 1802, and could not in the meantime preoccupy the same name used in another sense by another author—*Astatus* Jurine (proposed in May 1801) for a genus of *Tenthredinidae*, with properly designated exponents, is therefore a valid name, and its exponents being all synonyms of one species (*pygmaeus* L.) the genus is virtually a monotypical one.

In 1807 Jurine proposed a new name *Trachelus* in lieu of *Astatus* Jrn., remarking (Nouv. Méth. Hym. 72):

" J'avais d'abord donné à ce genre le nom d'*astatus*, qui a été adopté par MM. Panzer et Klug; mais des considérations particuliéres m'ont engagé à lui substituer celui de *trachelus* "—but this alteration of a name published six years previously in the Erlangen List cannot be accepted.

The Type of both *Astatus* Jrn. and *Cephus* Ltr. is **pygmaeus** L.—this species is also the type of *Trachelus* Jrn. (nn.).

Konow made *Astatus*, *Trachelus*, and also *Cephus*, etc., distinct genera, and Rohwer, apparently following him to some extent, gives to *Astatus* Jrn. the Type: *troglodyta* F., to *Cephus* Ltr. the Type: *pygmaeus* L., and to *Trachelus* Jrn. the Type: *tabidus* F. These divisions are probably of generic value, but the names proposed are unavailable in these senses—also *troglodyta* and *tabidus* are species not included in the Erlangen List. Rohwer also revives the name *Cepha* Billberg (with Type: *tabidus* F.), calling it isogenotypic with *Trachelus* Jrn.; it may be proved that the name *Cepha* Billberg is valid, but owing to its similarity to *Cephus* Ltr., *Cepha* Billberg would be a very undesirable name in the *Hymenoptera* and **Trachelastatus** (nn.) is here suggested in its place.

**Astatus* Knw. has been renamed by Schulz [Spolia Hym. 211 (1906)] *Eumetabolus*—with Type: *niger* Harris (*i. e. troglodyta*)—the identification of *niger*, however, with the Type-species of a genus which is almost certainly not British at all, rests on *very* sandy foundations. The *niger* of British collections = *satyrus* Pzr.

10

I·10. §**Urocerus** Jrn. Erl. Litt-Ztg. **1.** 163.

" Gen. 10 Urocerus—Sirex Camelus, Dromedarius."

XIPHYDRIA Ltr. (1802)

= § *Urocerus* Jrn. (1801) *nec* Geoffr-Fourcr.; = *Hybonotus* Klug (1803); = †*Xiphydra* (Ltr.) Pzr. (1806).

Type 1: **Ichneumon camelus** L. (Ltr. 1802; 1804).

Xiphydria Ltr. = §*Urocerus* Jrn. Erl. Litt-Ztg. **1.** 163 no. 10 (1801)—[**camelus** L.; *dromedarius* L.]. Xiphydria Ltr. HN. Crust-Ins. **3.** 304 (1802)—[Type: **camelus** L.]: **13.** 145–6 no. 332 sp. 1–3 (1804–5). *Hybonotus* Klug Mon. Siric. Germ. 9–16 sp. 1–2 Pf. 1·4–7, 8·9–15 (1803)—[Type: **camelus** L.] Xiphydria Ltr. Nouv. Dict. HN. **24.** Tbl. Méth. 173, 199 no. 376 (1804); F. Syst. Piez. pp. ix, 52–3 no. 8 sp. 1–3 (1804). §*Urocerus* Pzr. Fn. Ins. Germ. 85·10 (1805) †*Xiphydra* Pzr. Krit. Rev. Ins. Deutsch. **2.** 56–7 (1806).

XIPHYDRIA Ltr. Gn. Crust-Ins. **3**. 237–8 no. 432 (1807). §*UROCERUS* Jrn. Nouv. Méth. Hym. 73–5 no. 10 Pf. **2**·10, **7**·10 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 391 (1882); Rwr. US. Dp. Agr. (Ent.) Tech. Ser. **20**. 81, 92, 93 (1911).

Type 2: **Sirex dromedarius** F. (Ltr. 1810).

XIPHYDRIA* (Ltr.) Ltr. Cons. Gén. Crust-Ins. 296, 436 no. 391 (1810)—[Type: **dromedarius L.]; Wstwd. Syn. Gn. Br. Ins. 55 (1840).

[Having described the monotypical genus *Xiphydria* for *camelus* L., in 1802, it was not open to Latreille to cite *dromedarius* F. as the Type in 1810 !].

[*nec UROCERUS* [Gffr. (1762) *MN.*] Gffr-Fourcr. Ent. Paris **2**. 362–3 no. 84 (1785)—[Type: *gigas* L. (SIREX L.)].

§*Urocerus* Jrn., represented in the Erlangen List by *camelus* L., F., and *dromedarius* F. is homonymous with *Urocerus* (Gffr. 1762) Gffr-Fourcr. (1785) a monotypical genus with Type: *gigas* L. §*Urocerus* Jrn. must be replaced by *Xiphydria* Ltr. (1802) whose Type is *camelus* L.

Urocerus Gffr. is synonymous with *Sirex* L., consequently *Urocerus* is invalid in either sense.

11

1·11. SIREX (L.) Jrn. Erl. Litt-Ztg. **1**·163.

"Gen. 11 Sirex—Sirex Gigas."

[*i. e.* SIREX L. Fn. Suec. 396 sp. 1573–7 (1761); F. Ent. Syst. **2**. pp. iv, 124–32 no. 139 sp. 1–16 (1793)—**gigas** L., *etc.*]

SIREX L. (1761)

= *UROCERUS* [Gffr. (1761) *MN*] Gffr-Fourcr. (1784).

Type: **Sirex gigas** L. (Blmbch. 1779; Lmk. 1801).

SIREX L. Fn. Suec. (ed. **2**) pp. [41], 396–7, sp. 1573–7 (1761). [*UROCERUS* Gffr. Hist. Ins-Paris **2**. 264–6 (1762) *MN.*] SIREX L. Syst. Nat. (ed. **12**) **1** (**2**) 539, 928–30 no. 243 sp. 1–7 (1767) Blmbch. HB. Naturges. **1**. 378–9 no. 55 sp. 1 (1779) [**gigas** L.]; Leske Anfangs. Naturges. 519 (1779, 1784). *UROCERUS* Gffr-Fourcr. Ent. Paris **2**. 362–3 no. 84 (1785)—[Type: **gigas** L.]. SIREX F. Ent. Syst. **2**. pp. iv, 124–32 no. 139 sp. 1–26 (1793); Ltr. Préc. Car. Ins. 106 no. 2 (1796); Pzr. Fn. Ins. Germ. **52**·15–21 (1798); Lmk. Syst. An. sans Vert. 264 no. 117 (1801)—[Type: **gigas** L.] Jrn. Erl. Litt-Ztg. **1**. 163 no. 11 (1801). *UROCERUS* Ltr. HN. Crust-Ins. **3**. 304–5 (1802): **13**. 147–57 no. 333 sp. 1–6 Pf. **99**·4 (1804–5): Dict. HN. **24**. Tbl. Méth. 173 no. 377 (1804). SIREX Klug. Mon. Siric. Germ. 17–44 sp. 1–7 Pf. **2**·1–5, **3**·1–5, **4**·1–6, **5**·1–5, **8**·16–25 (1803); F. Syst. Piez. pp. ix, 48–51 no. 7 sp. 1–15 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 54–6 (1806); Jrn. Nouv.

Méth. Hym. 76–9 no. 11 Pf. 2·11, 7·11 (1807). *Urocerus* Ltr. Gn. Crust-Ins. 3. 238–45 no. 433 (1807): Cons-Gén. Crust-Ins. 297, 436 no. 393 (1810); Wstwd. Syn. Gn. Br. Ins. 55 (1840). Sirex Rwr. US. Dp. Agr. (Ent.) Tech. Ser. 20. 89, 91, 94 (1911).

Type 2: **Sirex noctilio** F. (= **juvencus* Crt.; Crt. 1829).

Sirex* (L.) Crt. Br. Ent. 6. expl. Pl. 253 (1829)—[Type: **noctilio F. (=* *juvencus* Crt.)].

Lamarck (1801) cited *gigas* L. as the Type of *Sirex* L.—this was the only exponent of that genus in the Erlangen List, as also in Blumenbach (1779), Leske (1779) *etc.*, Curtis cited "*juvencus*" (i. e. *noctilio* F.) as the Type in 1829, but *gigas* has always been regarded as the Type of *Sirex* L.

"Ordo II. Abdomine supra thoracem inflixo" (Jrn. Erl. Litt-Ztg. 1. 163 no. 1–4).

Neither of the present writers having studied any insects belonging to Jurine's Order 2, nor the first three genera of his Order 3 (*Ichneumon*, *Anomalon*, and *Bracon*) they are unable to do more than to collect evidence as to the early history of these names.

12

11·1. Evania (F). Jrn. Erl. Litt-Ztg. 1. 163.

"Gen. 1 Evania — Evania appendigaster, minuta: praeter utramque nulla."

[*i. e.* EVANIA F. Syst. Ent. 345 no. 108 sp. 1–2 (1775): Ent. Syst. 2. pp. v, 192–4 no. 141 sp. 1–6 (1793): Sppl. 241–2 (1798)—**appendigaster** L., etc.].

EVANIA F. (1775)

Type: **Ichneumon appendigaster** L. (Lmk. 1801; Ltr. 1802–1810).

Evania F. Syst. Ent. [25], 345 no. 108 sp. 1–2 (1775)—[1. **appendigaster** L.; 2. *maculata* F]: Ent. Syst. 2 pp. v, 192–4 no. 141 sp. 1–6 (1793); Ltr. Préc. Car. Ins. 114 no. 13 (1796); F. Sppl. Ent. Syst. 241–2 (1798); Pzr. Fn. Ins. Germ. 62·12 (1799): 77·10 (1800); Lmk. Syst. An. sans Vert. 267 no. 123 (1801)—[Type: **appendigaster** L.]; Jrn. Erl. Litt-Ztg. 1. 163 no. 1 (1801); Ltr. HN. Crust-Ins. 3. 330 (1802)—[Type: **appendigaster** L.. F.]: 13. 193–4 no. 340 sp. 1–2 Pf. 101·1 (1804–5): Nouv. Dict. HN. 24. Tbl. Méth. 175 no. 385 (1804); F. Syst. Piez. pp. ix, 178–80 no. 28 sp. 1–8, Ind. 11–12 (1804); Pzr. Krit. Rev. Ins. Deutsch. 2. 105 (1806); Jrn. Nouv. Méth. Hym. 84–5 no. 1 Pf. 2·1, 7·1 (1807); F-G. K. & K. MT Schweiz. Ent. Ges. 6. 391 (1882); Ltr. Cons-Gén. Crust-Ins. 297, 436 no. 395 (1810); Crt. Br. Ent. 6 expl. Pl. 257 (1829); Wstwd. Syn. Gn. Br. Ins. 56 (1840); Viereck US. Nat. Mus. Bull. 83. 58, 160 (1914).

13

II·2. **Foenus** (F.) Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 2 Foenus—Foenus Supplem."

[*i. e.* FOENUS F. Sppl. Ent. Syst. 210–11, 240 sp. 1–2 (1798)—*jaculator* L. and **assectator** L.]

FOENUS F. (1798)

= *Gasteruption* Ltr. (1796) *MN.*; ‡*Gasteryption* Smnv.

Type 1: **Ichneumon assectator** L. (Ltr. 1802; Crt. 1832).

Foenus F. [= *Gasteruption* Ltr. Préc. Car. Ins. 113–4 no. 12 (1796) *MN.*]. Foenus F. Sppl. Ent. Syst. 210–11, 240 sp. 1–2 (1798)—[**1.** *jaculator* L.; **2. assectator** L.]; Jrn. Erl. Litt-Ztg. **1.** 163 no. 2 (1801); Ltr. HN. Crust-Ins. **3.** 329 (1802)—[Type: **assectator** L., F.]: **13.** 194–5 no. 341 sp. 1–2 (1804–5): Ltr. Nouv. Dict. HN. **24.** Tbl. Méth. 175 no. 386 (1804); F. Syst. Piez. pp. viii, 141–2 no. 19 sp. 1–3 (1804); Jrn. Nouv. Méth. Hym. 86–8 no. 2 Pf. 2·2, 7·2 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 391 (1882); Crt. Br. Ins. **9.** expl. Pl. **423** (1832)—[Type: **assectator** L.]. *Gasteruption* Viereck US. Nat. Mus. Bull. **83.** 60, 61, 161 (1914).

Type 2: **Ichneumon jaculator** L. (Pzr. 1804–6; Ltr. 1810).

Foenus* (F.) Pzr. Fn. Ins. Germ. 96·16 (1804)—[jaculator** L.]: Krit. Rev. Ins. Deutsch. **2.** 90 (1806); Ltr. Cons-Gén, Crust-Ins. 298, 436 no. 396 (1810)—[Type: **jaculator** L., F.]; Wstwd. Syn. Gn. Br. Ins. 56 (1840)—[Type: **jaculator** L.]; Viereck US. Nat. Mus. Bull. **83.** 60, 171 (1914).

Latreille described *Gasteruption* in 1796 without exponents, and in 1802 he sunk this generic name as synonymous with *Foenus* F., giving as the common exponent of both *assectator* L., F.—Latreille's subsequent citation (in 1810) of *jaculator* L., F. as the Type of *Foenus* F., though accepted by Westwood (1840) and Viereck (1914) is invalid, and *assectator* L., F. (= †*affectator* Viereck) must be adopted as the Type of both *Foenus* L. and *Gasteruption* Ltr. (*teste* Ltr. 1802).

14

II·3. **Aulacus** Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 3 Aulacus."—[No types—a mere logonym.]

AULACUS Jrn. (1807)

Aulacus Jrn. (1801) *LN.*

Type: **Aulacus striatus** Jrn. (Jrn. 1807; Ltr. 1810).

Aulacus Jrn. [Erl. Litt-Ztg. **1.** 163 no. 3 (1801) *LN.*] Nouv. Méth. Hym. 89–90 no. 3 Pf. 2·3, 7·3 (1807)—[Type: **striatus** Jrn. Pf. 7·3]; F-G. K. & K. MT. Schweiz Ent. Ges. **6.** 391 (1882); Ltr.

Cons-Gén. Crust-Ins. 298, 436 no. 398 (1810); Viereck US. Nat. Mus. Bull. **83**. 18, 183 (1914).

Aulacus is merely mentioned as a Jurinean name in the Erlangen List (1801) without exponents, and only became validated in 1807.

15

II·4. STEPHANUS Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 4 Stephanus—Ichneumon serrator Supplem."

STEPHANUS Jrn. (1800)

Type: **Ichneumon serrator** F. (= *coronatus* Jrn.; Jrn. 1800; Jrn. 1801, 1807).

STEPHANUS Jrn., Pzr. Fn. Ins. Germ. **76**·13 (1800)—[Type: **serrator** F. (= *coronatus* Jrn.)]: Jrn. Erl. Litt-Ztg. **1**. 163 no. 4 (30. V. 1801)—[Type: **serrator** F.]: Prz. Krit. Rev. Ins. Deutsch. **2**. 75 (1806); Jrn. Nouv. Méth. Hym. 91–3 no. 4 Pf. **2**·4, **7**·4 (1807) F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 391 (1882); Viereck US. Nat. Mus. Bull. **83**. 138, 182 (1914).

"Ordo III. Abdomine petiolato: petiolo pone thoracem infixo" (Jrn. Erl. Litt-Ztg. **1**, 163–5 no. 1–48).

16

III·1. ICHNEUMON (L.) Jrn. Erl. Litt-Ztg. **1**, 163.

"Gen. 1 Ichneumon—Ichneumon."

[*i. e.* ICHNEUMON L. Syst. Nat. (ed. **10**) **1**. 343 no. 214, 560–8 no. 215 sp. 1–69 (1758); F. Ent. Syst. **2**. pp. iv, 132–92 no. 140 sp. 1–246 (1793): Sppl. 219–32 (1798)—**persuasorius** L.; *comitator* L.; *uctatorius* L.; *manifestator* L.; *etc.*].

ICHNEUMON L. (1758)

= *ICHNEUMON* L. (1746) *MN.*; = *RHYSSA* Gravenh. (1829).

Type 1: **Ichneumon persuasorius** L. (Lmk. 1801).

ICHNEUMON L. [Fn. Suec. (ed. **1**) 289–97 sp. 951–87 (1746) *MN.*] Syst. Nat. (ed. **10**) **1**. 343 no. 214, 560–8 no. 215 sp. 1–69 (1758) [14. *luctatorius* L.; 17. **persuasorius** L.; 23. *comitator* L.; 30. *manifestator* L.; *etc.*]: Fn. Suec. (ed. 2). [41–2], 397–411 sp. 1578–1647 (1761): Syst. Nat. (ed. **12**) **1** (2). 539, 930–41 no. 244 sp. 1–77 (1767); Blmbch. HB. Naturg. **1**. 379 no. 56 sp. 1–2 (1779); Leske Anfangs. Naturg. 519–20 no. 56 sp 1–4 (1779, 1784); F. Ent. Syst. **2**. pp. iv, 132–92 no. 140 sp. 1–246 (1793): Sppl. 219–32 (1798); Pzr. Fn. Ins. Germ. **19**·16–21 (1794): **45**·14–15, **47**·19 (1797): **52**·1–2 (1798): **70**·21, **71**·11–17, **72**·3–5 (1799): **73**·11–15, **76**·12, **78**·8–14, **79**·8–14, **80**·7–15 (1800), **81**·13, **83**·13, **84**·14–15 (1801): **92**·5–7, **94**·13–14 (1804): **98**·14, **100**·11–12, **102**·14 (1809); Ltr. Prée. Car. Ins. 112–113 no. 11 (1796); Lmk. Syst. An. sans. Vert. 265 no. 119

(1801)—[Type: **persuasorius** L.]: Jrn. Erl. Litt-Ztg. **1.** 163 no. 1 (1801); Ltr. HN. Crust-Ins. **3.** 319–27 (1802): **13.** 178–88 no. 337 sp. 1–36 Pf. 100·2–3 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 174–5 no. 382 (1804); F. Syst. Piez. pp. ix, 54–69 no. 9 sp. 1–85 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 57–67 (1806); Jrn. Nouv. Méth. Hym. 98–113 no. 1 Pf. 3·1, 8·1 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 391 (1882).

Type 2: **Ichneumon bidentatorius** F. (Crt. 1828).

Ichneumon* Crt. Br. Ent. **5. expl. Pl. **234** (1828)—[Type: **bidentatorius** F.]; Viereck US. Nat. Mus. Bull. **83.** 75 (1914).

[This species was not an original Type of the genus.]

Type 3: **Ichneumon comitator** L. (Crt. 1829; Wstwd. 1840).

Ichneumon* (L.) Crt. Br. Ent. **16. expl. Pl. **728** (1829)—[Type: **comitator** L.]; Wstwd. Syn. Gn. Br. Ins. 57 (1840); Viereck US. Nat. Mus. **83.** 75, 165 (1914).

Type 4: **Ichneumon luctatorius** L. (Ashm. 1900).

Ichneumon* (L.) Ashm. Pr. US. Nat. Mus. **23. 17, 175 no. 40 (1900)—Type: **luctatorius** L.; Viereck US. Nat. Mus. **83.** 75 (1914).

[*nec.* **Ichneumon* (L.) Ltr. Cons-Gén. Crust-Ins. 299–300, 436 no. 401 (1810); Viereck US. Nat. Mus. Bull. **83.** 52, 75, 117, 174 (1914)—Type: *manifestator* L. [**Pimpla** F. (= *Ephialtes* Gravenh.)]

Viereck (1914) accepts *manifestator* L. as the Type of *Ichneumon* L., following Latreille (1810), he however overlooks Lamarck (1801) who had already cited *persuasorius* L. as the Type—neither *manifestator* L. nor *persuasorius* L. belong to the genus *Ichneumon*, nor even to the *Ichneumoninae* of modern authors! Both are *Pimplinae*: *manifestator* L. an *Ephialtes* Gravenh., and *persuasorius* L. a *Rhyssa* Gravenh.—the latter therefore is synonymous with *Ichneumon* L.

Viereck sinks *Pimpla* F. as synonymous with *Ichneumon* L., but as *manifestator* L. is now shown not to be the earliest cited type of *Ichneumon* L., *Pimpla* F. becomes available for *manifestator* and *Ephialtes* Gravenh. will sink as a synonym. It is evident that the whole question will require very careful study by those interested in the *Ichneumonidae* since the facts to which attention is directed in the present paper appear to affect the validity of such important generic names as *Ichneumon*, *Cryptus*, *Pimpla*, etc., Auctt., and also of the groups higher than generic which have been named from them.

17

III·2. Anomalon Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 2 Anomalon—Ichneumon."

ANOMALON Pzr. (1804)

= *Anomalon* Jrn. (1801) *LN.*

Type: **Anomalon cruentatus** Pzr. (Pzr. 1804).

Anomalon Pzr. [Jrn. Erl. Litt-Ztg. **1.** 163 no. 2 (1801) *LN.*]; Pzr. Fn. Ins. Germ. **94**·15 (1804)—[Type: **cruentatus** Pzr.]: **95**·13 (1804)—[*alvearius* F. (= *aphidum* Pzr.)]: Krit. Rev. Ins. Deutsch. **2.** 67, 72, 75, 84, 88 (1806); Jrn. Nouv. Méth. Hym. 114–16 no. 2 Pf. **3**·2, **8**·2 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 391 (1882).

[*nec* **Anomalon* (Jrn.) Crt. Br. Ent. **5.** expl. Pl. **198** (1828); Viereck US. Nat. Mus. Bull. **83.** 12, 46, 172 (1914)—Type: *laetatorius* F. (Crt. 1828) (Bassus F.)]

Viereck (1914) follows Curtis who cited *laetatorius* F. as the Type of *Anomalon* Jrn. (1807) in 1838. This species was included by Jurine in his section **1**, while *cruentatus* Pzr. and *alvearius* F. (= *aphidum* Pzr.), the types of *Anomalon* Pzr., 1804, were included by Jurine in his section **2**. Curtis had overlooked the earlier use of *Anomalon* by Panzer, in Faun. Ins. Germ.—either *cruentatus* Pzr., or *alvearius* F. must be taken as Type of *Anomalon* Pzr. (= *Anomalon* Jrn., sect. **2**)—*cruentatus* Pzr. was the first species associated with the generic name *Anomalon*, which on the publication of Panzer's **94**·13 was a " monobasic " genus.

18

III·3. **Bracon** Jrn. Erl. Litt-Ztg. **1.** 163.

" Gen. 3 Bracon—Ichneumon desertor, denigrator."

BRACON Jrn. (1801)

Type: **Ichneumon desertor** L. (Crt. 1825; Wstwd. 1840).

Bracon Jrn. Erl. Litt-Ztg. **1.** 163 no. 3 (1801)—[I. **desertor,** L., F.; 2. *denigrator* F.]; F. Syst. Piez. pp. ix, 102–10 no. 12 sp. 1–40 (1804); Pzr. Fn. Ins. Germ. **92**·8 (1804); Krit. Rev. Ins. Deutsch. 72, 75–8 (1806); Jrn. Nouv. Méth. Hym. 117–18 no. 3 Pf. **3**·3, **8**·3 (1807); Ltr. Cons-Gén. Crust-Ins. 300–1, 436 no. 403 (1810); Crt. Br. Ent. **2.** expl. Pl. **69** (1825)—[Type: **desertor** L.]; Wstwd. Syn. Gn. Br. Ins. 64 (1840); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 391 (1882); Viereck US. Nat. Mus. Bull. **83.** 23, 166 (1914).

Fabricius (*teste* Jurine Nouv. Méth. 117) adopted the genus and generic name *Bracon* from Jurine himself. The same is the case with several other genera introduced in the Systema Piezatorum. This being so it seems clear that Fabricius either had the Erlangen Article before him, or

had seen (like Panzer) Jurine's actual text and plates before he published the genus *Bracon* in the Systema Piezatorum (1804). This would sufficiently explain the compliment paid to Jurine by Fabricius on p. vi (Syst. Piez.) by placing him, even dubiously (" forte "), in the highest rank " heroes " of scientific authors (*vide ante*, p. 355).

Curtis cited *desertor* L. as the Type of *Bracon* Jrn. in 1825; this citation has been accepted by Westwood, 1840, and Viereck 1914.

19

III·4. §**Pompilus** (F.) Jrn. Erl. Litt-Ztg. **1**. 163.

" Gen. 4 Pompilus—Pompilus Supplem. Evania punctum."

[*i e* POMPILUS F. Sppl. Syst. Ent. 212, 246–52 sp. 1–37 (1798), and *Evania punctum* F. Ent. Syst. **2**. 194 sp. 6 (1793)—thirty-eight species including **viaticus** F.]

PSAMMOCHARES Ltr. (1802)

= *Psammochares* Ltr. (1796) *MN.*; = §*Pompilus* F. (1798).

Type: **Sphex viatica** L. (Ltr. 1802, 1810).

Psammochares Ltr. [Préc. Car. Ins. 115–6 no. 16 (1796) *MN.*] = §*Pompilus* F. Sppl. Ent. Syst. 212, 246–52 sp. 1–37 (1798) [4. **viatica** L., *etc.*]; Pzr. Fn. Ins. Germ. **65**·15–17, **71**·19, **72**·8–9 (1799): **76**·16–17, **77**·12–13, **80**·17 (1800): **81**·15, **84**·19–20 (1801): **86**·10–12, **87**·21 (1804): **106**·12 (1809); Jrn. Erl. Litt-Ztg. **1**. 163 no. 4 (1801). §*Pompilus* F. (= *Psammochares* Ltr. *MN.*) Ltr. H.N. Crust-Ins. **3**. 334–5 (1802)—[Type: **viatica** L., F.]: **13**. 279–83 no. 378 sp. 1–9 (1804–5): Nouv. Dict. HN. **24**. Tbl. Méth. 180 no. 422 (1804); Pzr. Krit. Rev. Ins. Deutsch. 110, 112–19, 120, 188, 191 (1806); Jrn. Nouv. Méth. Hym. 119–22 no. 4 Pf. 3·4, 8·4 (1807); Ltr. Cons-Gén. Crust-Ins. 317, 437 no. 464 (1810); Crt. Br. Ent. **5**. expl. Pl. **238** (1828); Fox Ent. News **12**. 267–8 (1901).

[§*Pompilus* F. (1798) is homonymous with **Pompilus** Schneid. (1784) *Ceph.*]

Psammochares Ltr. (Préc. Car. Ins., 1796) was published without exponents, but in 1802 (Crust-Ins. **3**. 335) Latreille sunk *Psammochares* as a synonym of §*Pompilus* F., citing *viatica* L., F., as the Type. *Psammochares* then received as an exponent *viatica* L., and since §*Pompilus* F. has been found to be invalid as a homonym, its earliest synonym has been revived to replace it.

Latreille having indicated *viatica* L. as the Type of *Psammochares* Ltr., Sustera [Verh. ZB. Ges. Wien **62**: **1912** Abh. 210 (1912)] cannot be followed in making *plumbeus* F. the Type of *Psammochares* Ltr., nor in referring *viatica* L., F. to a different genus (viz. *Anoplius* Lep.).

20

III·5. SPHEX (L.) Jrn. Erl. Litt-Ztg. **1**. 163.

"**Gen. 5. Sphex—Sphex.**"

[*i. e.* SPHEX L. Syst. Nat. (ed. **10**) **1**. 343, 569–72 no. 216, sp. 1–25 (1758); F. Ent. Syst. **2**. pp. vi, 198–220 no. 143 sp. 1–92 (1793)—**sabulosa** L., *etc.*]

SPHEX L. (1758)

= *AMMOPHILA* Kby. (1798) = †*AMMOPHYLUS* (Kby.) Ltr. (1802).

Type: **Sphex sabulosa** L. (Blmbch. 1779; Lmk. 1801; Ltr. (1804).

SPHEX L. Syst. Nat. (ed. **10**) **1**. 343 no. 215, 569–72 no. 216 sp. 1–25 (1758): Fn. Suec. (ed. **2**) [42], 411–4 sp. 1648–64 (1761): Syst. Nat. (ed. **12**) **1** (**2**). 539, 941–7 no. 245 sp. 1–38 (1767); Blmbch. HN. Nat. Ges. **1**. 379–80 no. 57 sp. 1–2 (1779)—[Type: **sabulosa** L.]; Leske Anfangs. Naturges. 520–1 no. 57 (1779, 1784); F. Ent. Syst. **2**. pp. vi, 198–220 no. 143 sp. 1–92 (1793); Ltr. Préc. Car. Ins. 115 no. 15 (1796). *AMMOPHILA* Kby. Tr. Linn. Soc. Lond. **4**. 195–210 Pf. 19·1 (1798)—[Type: **sabulosa** L.]. SPHEX F. Sppl. Ent. Syst. 211–12, 243–5 (1798); Pzr. Fn. Ins. Germ. **51**·3–4, **52**·22–4, **53**·1–2 (1798): **65**·12–14, **72**·7 (1799): **76**·15, **80**·16 (1800): **100**·18 (1809); Lmk. Syst. An. sans Vert. 269–70 no. 128 (1801) —[Type: **sabulosa** L.]; Jrn. Erl. Litt-Ztg. **1**. 163 no. 5 (1801); Ltr. HN. Crust-Ins. **3**. 332–3 (1802): **13**. 292–4 no. 390 sp. 1–3 (1804–5); Ltr. Nouv. Dict. HN. **24**. Tbl. Méth. 180, 199 no. 424 (1804)—[Type: **sabulosa** L.]; F. Syst. Piez. pp. xii, 205–7 no. 35 sp. 1–4 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 122–4, 220 (1806); Jrn. Nouv. Méth. Hym. 125–9 no. 5 Pf. 3·5, 8·5 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 393 (1882). *AMMOPHILA* Ltr. Gn. Crust-Ins. **4**. 53–5 no. 480 (1809): Cons-Gén. Crust-Ins. 318, 437 no. 467 (1810). SPHEX H.T.Frnld. Ent. News **16**. 163–6 (1905); Kohl Ann. KK. Hofmus. Wien **21**:**1907** 228–9 (1907).

[*nec* **SPHEX* Ltr. Gn. Crust-Ins. **4**. 55–6 no. 481 (1809): Cons-Gén. Crust-Ins. 318, 438 no. 468 (1810)—*flavipennis* F. (CHLORION Ltr.)].

The Type of *Sphex* L. was fixed as **sabulosa** L., F., by Blumenbach (1779), Lamarck (1801), and Latreille (1802, 1804), but subsequently (in 1809 and 1810) Latreille proposed to reverse what he and others had already decided, specifying **sabulosa** (L.), F. as the Type of *Ammophila* Kirby, and *flavipennis* F. as the Type of *Sphex* L.—but *flavipennis* was a Fabrician species unknown to Linné and therefore not a possible type of *Sphex* L. Dr. H. T. Fernald [Ent. News **16**. 165 (1905)] has pointed out that *Ammophila* Kby, must sink as a synonym of *Sphex* L., the Type of both being **sabulosa** L., and that consequently "the subfamily *Ammophilinae* will become the *Sphecinae*"—*Chlorion* Ltr., should replace **Sphex* Auctt. This view is opposed by Kohl (1906), but we think that Fernald proves his case.

21

III·6. **Psen** Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 6 Psen—Sphex atra."

PSEN Jrn. (1801)

= *Psen* Ltr. (1796) *MN.*; = Mimesa Shuck (1837) = Dahlbomia Wissm. (1849) = **Pelopoeus* (p.) F.

Type 1: **Sphex atra** F. (Jrn. 1801; Ltr. 1802, 1804–5, *etc.*).

Psen Jrn. [Ltr. Préc. Car. Ins. 122–3 no. 24 (1796) *MN.*]; Jrn. Erl. Litt-Ztg. **1.** 163 no. 6 (1801)—[Type: **atra** F.]; Ltr. HN. Crust-Ins. **3.** 338 (1802)—[Type: **atra** F.]: **13.** 309–10 no. "ecexexi" sp. **1** (1804–5); Nouv. Dict. HN. **24.** Tbl. Méth. 180, 199 no. 435 (1804); Pzr. Fn. Ins. Germ. **96**·17 (1804); **98**·15 (1809); Krit. Rev. Ins. Deutsch. **2.** 10, 107–10 (1806); Jrn. Nouv. Méth. Hym. 135–7 no. 6 Pf. **3**·6, **8**·6 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 393 (1882); Ltr. Gn. Crust-Ins. **4.** 91–2 no. 507 (1809): Cons-Gén. Crust-Ins. 322, 438 no. 479 (1810); Crt. Br. Ent. **1.** expl. Pl. **25** (1824)—[Type: **atra** F. (= *compressicornis* F., Crt.)]; Wstwd. Syn. Gn. Br. Ins. 79 (1840); Kohl Ann. KK. NH. Hofmus. Wien **11.** 289–93 no. 9 tf. 9–10 (1896).

Jurine in the Erlangen List (1801) gave "*Sphex atra* F." as the exponent of *Psen*, anticipating Latreille's citation of the same species as Type, in 1802.

Kohl has examined Jurine's Types of *Psen serraticornis* Jrn. Pf. **8**·7 ♂, and *Psen atrata* ♀, and states [MT. Schweiz. Ent. Ges. **6.** 393 (1882)] that these are sexes of the same species—*Dahlbomia atra* F. Jurine was of the same opinion, for (Nouv. Méth. Hym. 137) he suggested that *compressicornis* F. (= *serraticornis* Jrn. Pf. **8**·7) and *atra* F., Pzr. (*atratum* F., Jrn. ♀) should be united.

In 1896, Kohl (Ann. KK. Hofmus. Wien **11.** 289–95) discusses the genera *Psen* and *Psenulus*, adopting *Psen* for *atra* F. and *Psenulus* for *Psen* Auctt.

22

III·7. **Stigmus** Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 7 Stigmus."—[Published without description and without types—a mere logonym.]

STIGMUS Pzr. (1804)

= *Stigmus* Jrn. (1801) *LN.*

Type: **Stigmus pendulus** Pzr. (Pzr. 1804).

Stigmus Pzr. [Jrn. Erl. Litt-Ztg. **1.** 163 no. 7 (1801) *LN.*]: Pzr. Fn. Ins. Germ. **86**·7 (1804)—[Type: **pendulus** Pzr.]: Krit. Rev. Ins. Deutsch. **2.** 271 (1806); Jrn. Nouv. Méth. Hym. **138–9** no. 7

Pf. 3·7, 9·7 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 393 (1882); Ltr. Gn. Crust-Ins. **4.** 84 no. 502 (1809).

[*nec* **Stigmus* Ltr. Cons. Gén. Crust-Ins. 325, 438 no. 491 (1810)—Type: *minutus* F. (**Diodontus** Crt.).]

Stigmus was first introduced in the Erlangen List (1801), but without exponents, and did not become validated until 1804, when Panzer (Fn. Ins. Germ. **86**·7) published "**Stigmus pendulus** *Mihi*," without citing any author for *Stigmus*—it seems therefore that Panzer must be treated as author and the genus as "monobasic." In the following year (1806—Krit. Rev. 271) Panzer stated that he no longer possessed a specimen of *Stigmus pendulus* and therefore could say nothing about its mouth-characters—a full description was furnished by Jurine in 1807. Latreille, in 1810, cited *Pemphredon minutus* F. as the type of *Stigmus*—but this was not an original type, nor was it congeneric with *pendulus*, being in fact a *Diodontus* Crt.

23

III·8. **Apius** Jrn. Litt-Ztg. **1.** 163.

"Gen. 8 Apius—Sphex figulus."

APIUS Jrn. (1801)

= *Trypoxylon* Ltr. (1796) *MN.*

Type: **Sphex figulus** F. (Jrn. 1801; Ltr. 1802).

Apius Jrn. [= *Trypoxylon* Ltr. Préc. Car. Ins. 121–2 no. 23 (1796) *MN.*]. Apius Jrn. Erl. Litt-Ztg. **1.** 163 no. 8 (1801)—Type: **figulus** F.] *Trypoxylon* Ltr. HN. Crust. Ins. **3.** 338–9 (1802)—[Type: **figulus** F.]: **13.** 310 no. "ccexcxii" sp. 1 (1804–5); Nouv. Dict. HN. **24.** Tbl. Méth. 180–1, 199 no. 436 (1804); F. Syst. Piez. pp. ix, 180–2, no. 29 sp. 1–6, Ind. 29 (1804); Pzr. Krit. Rev. Ins. Germ. **2.** 106–7 (1806). Apius Jrn. Nouv. Méth. Hym. 140–2 no. 8 Pf. 3·8, 9·8 (1807). *Trypoxylon* Ltr. Gn. Crust-Ins **4.** 75–6 no. 497 (1809): Cons-Gén. Crust-Ins. 323, 438 no. 487 (1810).

The two genera *Apius* Jrn. and *Trypoxylon* Ltr. are absolute synonyms and *Apius* being the first published with a type must be adopted.

24

III·9. **Larra** (F.) Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 9 Larra—Larra."

[*i.e.* LARRA F. Ent. Syst. **2.** 220–2 no. 144 sp. 1–7 (1793)—founded on seven species, including sp. 4 **anathema** Rossi (= *ichneumoniformis* F.)]

LARRA F. (1793)

Type: **Sphex anathema** Rossi (= *ichneumoniformis* F.; Ltr. 1802, 1810).

Larra F. Ent. Syst. **2.** pp. v. 220–2 no. 144 sp. 1–7 (1793)—[seven species including **anathema** Rossi (= *ichneumoniformis* F.)]; Ltr. Préc. Car. Ins. 116 no. 17 (1796); F. Sppl. Ent. Syst. 252–3 (1798); Jrn. Erl. Litt-Ztg. **1.** 163 no. 9 (1801); Pzr. Fn. Ins. Germ. **76**·18 (1800), **89**·13 (1804), **106**·13–17 (1809); Ltr. HN. Crust-Ins. **3.** 335–6 (1802)—[Type: **anathema** Rossi (= *ichneumoniformis* F., Ltr.]: **13.** 295–7 no. 393 sp. 1–2 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 180 no. 427 (1804); F. Syst. Piez. pp. xi, 219–22 no. 38 sp. 1–14, Ind. 17–18 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 127–9, 129 (1806); Jrn. Nouv. Méth. Hym. 143–5 no. 9 Pf. **3**·9, **9**·9 (1807); Ltr. Gn. Crust-Ins. **4.** 70–1 no. 491 (1809): Cons-Gén. Crust-Ins. 322, 438 no. 482 (1810); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 393 (1882).

25

III·10. **Dimorpha** Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 10 Dimorpha—Tiphia abdominalis Panzer."

DIMORPHA Jrn. (1801)

= *Astata* Ltr. (*Astatus* Ltr.) (1796) *MN.*

Type: **Sphex boops** Schrk. (= *abdominalis* Pzr.; Jrn. 1801; Ltr. 1802–10).

Dimorpha Jrn. [= *Astata* Ltr. Préc. Car. Ins. pp. xiii (*Astatus* Ltr.) 114–5 (1796) *MN.*]. Dimorpha Jrn. Erl. Litt-Ztg. **1.** 163 no. 10 (1801)—[Type: **boops** Schrk. (= *abdominalis* Pzr.; Jrn.)]. *Astata* Ltr. H.N. Crust-Ins. **3.** 336–7 (1802)—[Type: **boops** Schrk. (= *abdominalis* Pzr.; Ltr.)]: **13.** 297 no. 394 sp. 1 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 180, 199 no. 428 (1804), Dimorpha Pzr. Krit. Rev. Ins. Deutsch. **2.** 10, 126–7 (1806); Jrn. Nouv. Méth. Hym. 146–7 no. 10 Pf. **3**·10, **9**·10 (1807)—[Type: **boops** Schrk. (= ♀ *abdominalis* Pzr., Jrn.; ♂ = *ocularis* Jrn. Pf. **9**·10) (1807)]; Pzr. Fn. Ins. Germ. **107**·13 (1809). *Astata* Ltr. Gn. Crust-Ins. **4.** 67–9 no. 490 (1809): Cons-Gén. Crust-Ins. 322, 438 no. 480 (1810).

The case of this genus is exactly parallel to that of *Apius* and *Trypoxylon*. The name *Astata* (or *Astatus*) was published without exponents by Latreille in 1796, before Jurine's genus *Dimorpha*, founded on "*Tiphia abdominalis*" [*i. e.* **boops** Schrk.] in May 1801. Panzer (Fn. Ins. Germ.) was the first author to associate species with *Astatus*,* also in the year 1801, viz. *troglodyta* F. (**83**·12), *tabidus* F., and *spinipes* Pzr. (**85**·11), *satyrus* Pzr. and

* Jurine (*nec* Latreille)—i. e. the Sawfly, not the Fossor, *vide* pp. 393–4.

pygmaeus F. (85·12)—these plates with their accompanying text were issued in Jahrgang 7 (Hefts 73–84), the preface of which is dated 3 September 1801. The date of Heft 83 may be assumed to be July 1801; Heft 85 was also issued in 1801. In 1802 Latreille designated **boops** Schrk. (= *abdominalis* Pnzr., Ltr.) as the type of *Astata* Ltr., but *Dimorpha* Jurine had already been published with the same type some months earlier, in May 1801 and the name *Dimorpha* employed by Panzer (Krit Rev.) and Jurine (Nouv. Méth. Hym.) should be adopted.

[*nec* ASTATUS Jrn. (1801) (*nec* Ltr.) with the Type *pygmaeus* L. *vide* **ASTATUS** Jrn. *ante*, p. 383.]

26

III·11. **TIPHIA** (F.) Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 11. Tiphia—Tiphia."

[*i. e.* TIPHIA F. Ent. Syst. 353–4 no. 110 sp. 1–8 (1775)—founded on eight species including 1. **femorata** F.]

TIPHIA F. (1775)

Type: **Tiphia femorata** F. (Ltr. 1802; 1810) [? = *villosa* F.; Lmk. 1801].

TIPHIA F. Syst. Ent. [25], 353–4 no. 110 sp. 1–8 (1775)—[1. **femorata** F., *etc.*]: F. Ent. Syst. **2.** pp. v, 223–8 no. 145 sp. 1–29 (1793); Ltr. Préc. Car. Ins. 117–18 no. 18 (1796) *MN.*; Pzr. Fn. Ins. Germ. **47**·20 (1797): **53**·3–6, **55**·1 (1798): **77**·14, **81**·14 (1800); F. Sppl. Syst. Ent. 254–5 (1798); Lmk. Syst. An. sans Vert. 269 no. 126 (1801)—[Type: *villosa* F. (? = **femorata** F.)]; Jrn. Erl. Litt-Ztg. **1.** 163 no. 11 (1801); Ltr. HN. Crust-Ins. **3.** 348–9 (1802)—[Type: **femorata** F. — Ltr. includes also *maculata* F. which was not a type]: **13.** 267–8 no. 372 sp. 1–3 (1804–5): Ltr. Nouv. Dict. HN. **24.** Tbl. Méth. 179 no. 416 (1804): F. Syst. Piez. pp. viii, 232–5 no. 42 sp. 1–23, Ind. 28–9 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 133 (1806); Jrn. Nouv. Méth. Hym. 148–9 no. 11 Pf. **3**·11, **9**·11 (1807); Ltr. Gn. Crust-Ins. **4.** 116–7 no. 520 (1809): Cons-Gén. Crust-Ins. 315, 437 no. 455 (1810)—[Type: **femorata** F.]

Lamarck [Syst. An. sans Vert. 369 (1801)] selected *Tiphia villosa* F. as the Type of *Tiphia* F.—this was not one of the original types, unless, as seems probable, it can be identified as the ♂ of the well-known *femorata* F., which was cited as the Type by Latreille in 1802 (HN. Crust-Ins. **3.** 348–9), and 1810 (Cons. Gén. 437)—**femorata** was one of the original species and must be accepted as the Type.

[*Tiphia villosa* is said to have *abdomen nigrum, immacu-*

latum, scanty pilosity, and to be of the size of *femorata*. A ♂ specimen, named by Fabricius himself as *Tiphia villosa*, was seen by Latreille and is stated by him to differ from *femorata* only in the colour of the legs. This makes it certain that Saussure and Sichel were mistaken in applying the name *villosa* F. to a species of *Elis*.]

27

III·12. **Scolia** (F.) Jrn. Erl. Litt-Ztg. **1**. 163.

"Gen. 12 Scolia—Scolia."

[*i. e.* SCOLIA F. Syst. Ent. [26], 355–6 no. 111 sp. 1–10 (1775)—founded on ten species including 3 **flavifrons** F. and 8 *quadripunctata* F.].

SCOLIA F. (1775)

Type 1: **Scolia flavifrons** F. (= *hortorum* F., Ltr. 1802; ? = *haemorrhoidalis* F., Lmk. 1801).

Scolia F. Syst. Ent. [26], 355–6 no. 111 sp. 1–10 (1775)—[3 **flavifrons** F.; 8 *quadripunctata* F., and eight other species]: Ent. Syst. **2**. pp. vi, 228–38 no. 146 sp. 1–38 (1793): Sppl. Ent. Syst. 255–7 (1798); Pzr. Fn. Ins. Germ. 3·22 (1793): 62·13–14, 66·18 (1799); Lmk. Syst. An. sans Vert. 269 no. 127 (1801) —[Type: *haemorrhoidalis* F. (? = **flavifrons** F.)]; Jrn. Erl. Litt-Ztg. **1**. 163 no. 12 (1801); Ltr. HN. Crust-Ins. **3**. 347 (1802)—[Type: **flavifrons** F. (= *hortorum* F., Ltr.)]: **13**. 273–6 no. 376 sp. 1–5 (1804–5): Nouv. Dict. HN. **24**. Tbl. Méth. 180 no. 420 (1804); F. Syst. Piez. pp. xii, 238–45, Ind. 25–6 no. 44 sp. 1–39 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 11, 137–40, 220 (1806); Jrn. Nouv. Méth. Hym. 155–8 no. 12 Pf. 3·12, 9·12 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 394 (1882); Ltr. Gn. Crust-Ins. **4**. 105–7 no. 513 (1809).

Type 2: **Scolia quadripunctata** F. (Ltr. 1810).

Scolia (F.) Ltr. Cons-Gén. Crust-Ins. 316, 437 no. 459 (1810)—[Type: *quadripunctata* F.].

Lamarck, in January 1801 (Syst. An. sans Vert. 269) selected *Scolia haemorrhoidalis* F. as the Type of *Scolia* F. This is a well-known form, but was not one of the original types, unless with Dalla Torre we regard it as a variety of the common **Scolia flavifrons** F. (= *hortorum* F.). Latreille, in 1802 (HN. Crust. Ins. **3**. 346) cited as Type: **flavifrons** F. (= *hortorum* F., Ltr.)—his Type being therefore congeneric and very probably conspecific with Lamarck's.

In 1810, Latreille (Cons. Gén. 437) selected another species, *quadripunctata* F. as Type, but this later citation can have no effect as the type of *Scolia* was already fixed.

28

III·13. **Sapyga** (Ltr.) Jrn. Erl. Litt-Ztg. **1.** 163.

"Gen. 13 Sapyga—Scolia Prisma."

[*i. e.* SAPYGA Ltr. Préc. Car. Ins. 134–5 no. 37 (1796) *MN.*]

SAPYGA Jrn. (1801)

= *Sapyga* Ltr. (1796) *MN.*; = *Hellus* F. (1804).

Type 1: **Apis clavicornis** L. (= *prisma* F.; Jrn. 1801).

Sapyga Jrn. [Ltr. Préc. Car. Ins. 134–5 no. 37 (1796) *MN.*]; Jrn. Erl. Litt-Ztg. **1.** 163 no. 13 (30. V. 1801)—[Type: **clavicornis** L. (= *prisma* F.; Jrn.)]; Ltr. HN. Crust-Ins. **13.** 271–3 no. 375 sp. 1–2 (1804–5); Klug Mon. Siric. Germ. 57–64 sp. 1–2 Pf. 7·4–8, 8·31–8 (1803). *Hellus* F. Syst. Piez. pp. xiii, 246–7 no. 45 sp. 1–3 (1804)—[Type: **clavicornis** L. (= *prisma* F.)]. Sapyga Pzr. Fn. Ins. Germ. **87**·19–20 (1804): **100**·17, **106**·18 (1809). *Hellus* Pzr. Krit. Rev. Ins. Deutsch. **2.** 140–2 (1806). Sapyga Jrn. Nouv. Méth. Hym. 159–61 no. 13 Pf. 3·13, 9·13 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 394 (1882); Ltr. Gn. Crust-Ins. **4.** 108–9 no. 514 (1809).

Type 2: **Scolia quinquepunctata** F. (Ltr. 1802).

Sapyga Ltr. HN. Crust-Ins. **3.** 346 (1802)—[Type: **quinquepunctata** F.]: **13.** 271–3 no. 375 sp. 1–2 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 180, 199 no. 419 (1804): Cons-Gén. Crust-Ins. 316, 437 no. 460 (1810)—[Type: **quinquepunctata** F. (= *sexpunctella* F., Ltr.)]

The name *Sapyga* was first published in 1796, by Latreille, but without exponents. In 1801 the Erlangen List appeared and *Sapyga* was validated by Jurine's citation of **clavicornis** L. (= *prisma* F., Jrn.). Latreille, in 1802 (HN. Crust-Ins. **3.**), and in 1804 (Nouv. Dict.) specified **quinquepunctata** F. as Type, and again in 1810 he cited the same species as Type under the name "*Hellus sexpunctatus* F."—but as all Latreille's citations are subsequent to the Erlangen List **clavicornis** L. must be accepted as the Type.

29

III·14. **Myrmosa** (Ltr.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 14 Myrmosa—Hylaeus thoracicus."

[*i. e.* MYRMOSA Ltr. Préc. Car. Ins. 118 no. 19 (1796) *MN.*]

MYRMOSA Jrn. (1801)

= *Myrmosa* Ltr. (1796) *MN.*

Type 1: **Tiphia ephippium** F. (= *thoracicus* F.; Jrn. 1801).

Myrmosa Jrn. [Ltr. Préc. Car. Ins. 118 no. 19 (1796) *MN.*];

Jrn. Erl. Litt-Ztg. **1.** 164 no. 14 (1801)—[Type: **ephippium** F. (= *thoracicus* F.; Jrn.)]; Pzr. Fn. Ins. Germ. **85**·14 (1804): Krit. Rev. Ins. Deutsch. **2.** 10, 136–7 (1806); Jrn. Nouv. Méth. Hym. 162–3 no. 14 Pf. **3**·14, **9**·14 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 394 (1882); Ltr. Gn. Crust-Ins. **4.** 119–20 no. 523 (1809): Cons-Gén. Crust-Ins. 314, 437 no. 452 (1810)—[Type: **ephippium** F.].

Type 2: **Mutilla melanocephala** F. (= *nigra* Rossi; Ltr. 1802).

Myrmosa Ltr. [Préc. Car. Ins. 118 no. 19 (1796) *MN.*]: HN. Crust-Ins. **3.** 349–50 (1802)—[Type: **melanocephala** F. (= *nigra* Rossi; Ltr.)]: **13.** 266–7 no. 371 sp. 1 (1804–5)—[Type: **melanocephala** F.]: Nouv. Dict. HN. **24.** Tbl. Méth. 179 no. 415 (1804).

This is another of the genera published without types by Latreille in 1796, and with Type by Jurine in the Erlangen List. Jurine, in 1801, gave as its exponent *Hylaeus thoracicus* F. only—this species is identified as **Tiphia ephippium** F. (1775) both by Dalla Torre and by André [Sp. Hym. **8.** 441–2 (1899)]. Jurine in the Nouvelle Méthode figures the same species under the name **ephippium** F., and in the text gives *Hylaeus thoracicus* F. as a synonym of it—**ephippium** F. is therefore the Type of the genus.

Mutilla nigra Rossi, which Latreille cited as the Type in 1802, is, according to the same authorities, synonymous with the more common species *melanocephala* F., but Jurine's designation has priority, and was adopted by Latreille himself in 1810.

30

III·15. **Vespa** (L.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 15 Vespa—Vespa."

[*i. e.* VESPA L. Syst. Nat. (ed. **10**) **1.** 343 no. 216, 572–4 no. 217 sp. 1–17 (1758)—founded on seventeen species, including **1. crabro** L. and 2. *vulgaris* L.]

VESPA L. (1758)

Type 1: **Vespa crabro** L. (Lmk. 1801; Ltr. 1804, 1810).

Vespa L. Syst. Nat. (ed. **10**) **1.** 343 no. 216, 572–4 no. 217 sp. 1–17 (1758)—[1. **crabro** L., 2. *vulgaris* L., and 15 other species]: (ed. **12**) **1** (**2**). 539, 948–52 no. 247 sp. 1–28 (1767); F. Ent. Syst. **2.** pp. v, 253–83 no. 151 sp. 1–102 (1793); Pzr. Fn. Ins. Germ. **17**·18 (1794): **47**·21 (1797): **49**·19–24, **53**·7–10 (1798): **63**·1–8, **64**·12 (1800): **81**·16–18 (1801); Lmk. Syst. An. sans Vert. 271 no. 131 (1801)—[Type: **crabro** L., F.]; Jrn. Erl. Litt-Ztg. **1.** 164 no. 15 (1801); Ltr. Nouv. Dict. HN. **24.** Tbl. Méth. 181, 199 no. 447 (1804)—[Type: **crabro** L., F.]; F. Syst. Piez. pp. xii, 253–68 no.

49 sp. 1–78, Ind. 29–30 (1804); Pzr. Krit. Rev. Ins. Deutsch. 2. 148–60 (1806); Jrn. Nouv. Méth. Hym. 164–72 no. 15 Pf. 4·15, 9·15 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. 6. 391 (1882); Ltr. Gn. Crust-Ins. 4. 142–3 no. 537 (1809): Cons-Gén. Crust-Ins. 330, 438 no. 504 (1810).

Type 2: **Vespa vulgaris** L. (Ltr. 1802, 1804).

Vespa (L.) Ltr. HN. Crust-Ins. 3. 364 (1802)—Type: **vulgaris** L., F.]: 13. 350–2 no. 403 sp. 1–5 (1804–5).

Lamarck's selection of **Vespa crabro** L. is the earliest, and unexceptionable; it was accepted by Latreille in 1804 and 1810, although previously (1802–4) he had cited Linné's second species, **vulgaris** L.

31

III·16. **Bembex** (F.) Jrn. Litt-Ztg. 1. 164.

"Gen. 16 Bembex—Bembex."
[*i.e.* BEMBEX F. Ent. Syst. 2. pp. vi, 247–52 no. 150 sp. 1–16 (1793)—founded, in 1775, on 1. *signata* L.; 2. *punctata* F.; 3. **rostrata** L.]

BEMBIX F. (1775)

= †*Bembyx* F. (1775); †*Bembex* F. (1777)—[‡Bembix F.—*βέμβιξ* (a whipping-top)].

Type: **Apis rostrata** L. (Rossi 1790; Ltr. 1802–10).

Bembix F. Syst. Ent., Char. Gen. [27], no. 115 (1775). †*Bembyx* F. Syst. Ent. 361–2 no. 115 sp. 1–3 (1775)—[1. *signata* L., F.; 2. *punctata* F.; 3. **rostrata** L., F.] Bembex F. Gn. Ins. 122 no. 115 (1777): Sp. Ins. 1. 457–8 no. 118 sp. 1–4 (1781): Mant. Ins. 1. pp. xvi, 285–6 no. 123 sp. 1-9 (1787); Olvr. Enc. Meth. HN. 4 (Ins. 1). 286–92 sp. 1–12 (1789); Roemer Gn. Ins. L-F. 60 no. 123 Pf. 27·9–10 (1789); Rossi Fn. Etrusc. 2. 81–2 no. 123 sp. 857–9 (1790) [**rostrata** L., F.]; F. Ent. Syst. 2. pp. vi, 247–52 no. 150 sp. 1–16 (1793): Sppl. 259–60 (1798); Pzr. Fn. Ins. Germ. 1·10 (1793)—[**rostrata** L.]: 84·21–2 (1801): 86·13 (1804); Ltr. Préc. Car. Ins. 130–1 no. 33 (1796); Jrn. Erl. Litt-Ztg. 1. 164 no. 16 (1801); Ltr. HN. Crust-Ins. 3. 345 (1802)—[Type: **rostrata** L., F.]: 13. 299–302 no. 395 sp. 1–2 (1804–5): Ltr. Nouv. Dict. HN. 24. Tbl. Méth. 180 no. 429 (1804); F. Syst. Picz. pp. xiii, 222–7, Ind. 4–5, no. 39 sp. 1–21 (1804); Pzr. Krit. Rev. Ins. Deutsch. 2. 130–2, 220 (1806); Jrn. Nouv. Méth. Hym. 173–5 no. 16 Pf. 4·16, 10·16 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. 6. 394 (1882); Ltr. Gn. Crust-Ins. 4. 97–9 no. 510 (1909): Cons-Gén. Crust-Ins. 320, 438 no. 474 (1810)—[Type: **rostrata** L., F.].

[*nec* **Bembex* (L.) Lmk. Syst. An. sans Vert. 272 no. 132 (1801)—*signata* F. (**Monedula** Ltr.)].

Rossi, in 1790 (Fn. Etrusc. 81–2), enumerated three species of *Bembex* F., only one of which, **rostrata** F., was an

original type. In 1793 Panzer figured and diagnosed *Bembex rostrata*, and in 1801 Lamarck (Syst. An. sans Vert. 272) enumerated two other species, only one of which, *signata* F., was an original type. We come next to Latreille's definite revision of the genus in 1802, when he separated *Monedula* Ltr., (n. g.), with Type *carolina* F., Coq. (*teste* Ltr. 1804) from *Bembex* F., citing as Type **rostrata** F. This is rather fortunate, for if Lamarck had definitely chosen *signata* as his Type it might have been necessary to call *Monedula* Ltr. a *Bembix*, and to find another name for the present genus *Bembex* Auctt.

32

III·17. MASARIS (F.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 17 Masaris—Masaris."

[*i. e.* MASARIS F. Ent. Syst. **2.** pp. vi, 283–5 no. 152 sp. 1–2 (1793) —founded on two species, 1. **vespiformis** F. and 2. *dubia* Rossi (= *apiformis* F.)]

MASARIS F. (1793)

Type: **Masaris vespiformis** F. (Ltr. 1802, 1804, 1810).

MASARIS F. Ent. Syst. **2.** pp. vi, 283–5 no. 152 sp. 1–2 (1793)—[1. **vespiformis** F.; 2. *dubia* Rossi (= *apiformis* F.)]; Pzr. Fn. Ins. Germ. **47**·22 (1797): **76**·19 (1800); Jrn. Erl. Litt-Ztg. **1.** 164 no. 17 (1801); Ltr. HN. Crust-Ins. **3.** 368 (1802)—[Type: **vespiformis** F.]: **13.** 353 no. 404 Pf. **102**·8 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 181, 199 no. 448 (1804); F. Syst. Piez. pp. xii, 292, Ind. 18, no. 53 sp. 1 (1804); Jrn. Nouv. Méth. Hym. 182–4 no. 17. Pf. **4**·17, **10**·17 (1807); Ltr. Gn. Crust-Ins. **4.** 144 no. 538 (1909): Cons-Gén. Crust-Ins. 330, 438 no. 505 (1810).

The Fabrician genus *Masaris* was founded on two species, **vespiformis** F. (from Barbary) and *apiformis* F. (from Italy). In 1802, Latreille revised the genus, restricting *Masaris* F. to **vespiformis** F., and proposing the new genus *Celonites* for *apiformis* F. When describing *Masaris apiformis*, in 1793, Fabricius correctly gave as a synonym *Chrysis dubia* Rossi (1790)—Rossi's name must be restored, and the species should be known as **Celonites dubia** Rossi (= *apiformis* F.).

Fabricius accepted Latreille's restriction, in 1804 (Syst. Piez. 292), but Jurine (Nouv. Méth. Hym. 182–4) 1807, still continued to call *apiformis* F. a *Masaris*, stating that he had not seen **vespiformis** F., and that he did not know whether its differences from *dubia* Rossi (= *apiformis* F.,

Jrn.) were generic—"*Masaris*" of the Erlangen List was therefore really *Celonites* Ltr. No true *Masaris* has, we believe, been recorded from Europe.

33

III·18. SIMBLEPHILUS Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 18 Simblephilus—Philanthus pictus Panzer."

SIMBLEPHILUS Jrn. (1801)

= **PHILANTHUS* (*nec* F.) Ltr.

Type: **Vespa triangulum** F. (= *pictus* Pzr.; Jrn. 1801).

SIMBLEPHILUS Jrn. Erl. Litt-Ztg. **1.** 164 no. 18 (1801)—[Type: **triangulum** F. (= *pictus* Pzr.)]. **PHILANTHUS* Ltr. HN. Crust-Ins. **3.** 366–7 (1802): **13.** 313–4 no. "cccxcxiii" sp. 1–2 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 181 no. 437 (1804). SIMBLEPHILUS Jrn. Nouv. Méth. Hym. 185–8 no. 18 Pl. **4**·18, **10**·18 (1807). **PHILANTHUS* Ltr. Gn. Crust-Ins. **4.** 95 no. 510 (1809): Cons-Gén. Crust-Ins. 326, 438 no. 496 (1810)—[Type: **triangulum** F. (= *pictus* Pzr.)].

The application of the generic name *Simblephilus* Jrn. is discussed under *Philanthus* F. (no. 38, pp. 408–10).

34

III·19. MELLINUS (F.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 19 Mellinus—Mellinus ruficornis. Crabro U-flavum Hellwig."

[*i. e.* MELLINUS F. Skr. NH. Selsk. Kjobnhavn. **1.** 226 no. 8 sp. 1–5 (1790): Ent. Syst. **2.** pp. v, 285–8 no. 153 sp. 1–7 (1793)—founded on three species, including **arvensis** L. (= *U-flavum* Hlwg., Jrn.)].

MELLINUS F. (1790)

Type: **Vespa arvensis** L. (= *U-flavum* Hlwg.; = *bipustulatus* F.) (Ltr. 1802).

MELLINUS F. Skr. NH. Selsk. Kjobnhavn. **1.** 226 no. 8 sp. 1–5 (1790)—[**arvensis** L. (= 4. *arvensis* F.; = 5. *bipustulatus* F.) and two other species]: Ent. Syst. **2.** pp. v, 285–8, no. 153 sp. 1–7 (1793); Ltr. Préc. Car. Ins. 124–5 no. 26 (1796); Pzr. Fn. Ins. Germ. **53**·11–13 (1798): **72**·13–14 (1799): **73**·19, **77**·17–18, **80**·18 (1800): **98**·17–18 (1809); Jrn. Erl. Litt-Ztg. **1.** 164 no. 19 (1801)—[1. *sabulosus* L. (= *ruficornis* F., Jrn.); 2. **arvensis** L. (= *U-flavum* Hlwg., Jrn.)]; Ltr. HN. Crust-Ins. **3.** 339 (1802)—[Type: **arvensis** L.]: **13.** 318–20 no. "cccxcxv" sp. 1–5 (1804–5): Nouv. Dict. HN. **14.** 281–2 (1804): **24.** 181 no. 439 (1804); F. Syst. Piez. pp. viii, 297–300 no. 56 sp. 1–13 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 167–9

(1806); Jrn. Nouv. Méth. Hym. 189–91 no. 19 Pf. 4·19, 10·19 (1807); Ltr. Gn. Crust-Ins. 4. 85–6 no. 503 (1809): Cons-Gén. Crust-Ins. 325, 438 no. 493 (1810).

The two species cited by Jurine as exponents of *Mellinus*, viz. *ruficornis* and *U-flavum*, are synonyms respectively of two species assigned practically by all authors to this genus, viz. *sabulosa* L., and **arvensis** L.

35

III·20. ARPACTUS Jrn. Erl. Litt-Ztg. 1. 164.

"Gen. 20 Arpactus—Mellinus mystaceus, quinquecinctus."

ARPACTUS Jrn. (1801)

‡HARPACTUS Shuck. (1837); ‡HARPACTES Dhlb. (1843)

= CEROPALES Ltr. [1796 *MN.*] (1802); = *GORYTES* Ltr. (1804); = *HOPLISUS* Lep. (1832).

Type 1: **Sphex mystacea** L. (= *Mellinus mystaceus* F.; Jrn.).

ARPACTUS Jrn. Erl. Litt-Ztg. 1. 164 no. 20 (1801)—[Types: 1. **mystaceus** L., F.; 2. *quinquecinctus* F.]; Pzr. Krit. Rev. Ins. Deutsch. 2. 10, 164–6 (1806); Jrn. Nouv. Méth. Hym. 192–4 no. 20 Pf. 4·20, 10·20 (1807) [1. **mystaceus** L.; 4. *quinquecinctus* F.]; F-G. K. & K. MT. Schweiz. Ent. Ges. 6. 394 (1882). **GORYTES* Ltr. Cons-Gén. Crust-Ins. 321; 438 no. 477 (1810)—[Type: **mystaceus** F.]; Crt. Br. Ent. 11. expl. Pl. 524 (1834).

Type 2: **Mellinus quinquecinctus** F. (Ltr. 1802, 1804).

CEROPALES Ltr. [Préc. Car. Ins. 123–4 no. 25 (1796) *MN.*]: HN. Crust-Ins. 3. 335, 339–40 (1802)—[Type: **quinquecinctus** F.]; Jrn. Nouv. Méth. Hym. 193 (1807). *GORYTES* Ltr. Nouv. Dict. HN. 4. 541 (1803–4): 24. Tbl. Méth. 180 no. 434 (1804)—[Type: **quinquecinctus** F.]: HN. Crust-Ins. 13. 308-9 no. "cccxcx." sp. 1–2 (1804–5). *HOPLISUS* Lep. Ann. Soc. Ent. Fr. 1. 61–6 sp. 1–3 (1832) —[Type: **quinquecinctus** F.]

[*nec* **CEROPALES* Ltr. Nouv. Dict. HN. 24. Tbl. Méth. 180 no. 423 (1804)—[Type: **maculata** F.]: HN. Crust-Ins. 13. 283–4 no. 379 sp. 1–3 (1804–5): F. Syst. Piez. pp. viii, 185–7, Ind. 7, no. 31 sp. 1–9 (1804); Pzr. Krit. Rev. Ins. Deutsch. 2. 110–12 (1806); Jrn. Nouv. Méth. Hym. 123–4 (1807); Pzr. Fn. Ins. Germ. 106·12 (1809); Ltr. Gn. Crust-Ins. 4. 62–3 no. 488 (1809): Cons-Gén. Crust.-Ins. 317, 437 no. 465 (1810)—[Type: **maculata** F.]; Crt. Br. Ent. 16. expl. Pl. 736 (1839); Dalla Torre Cat. Hym. 8. 340–6 (1897)—[Type: **maculata** F. (HYPSICERAEUS nn.].

The genus *Arpactus* Jrn. was first published in the Erlangen List (1801) with two exponents **mystaceus** L., F., and *quinquecinctus* F. *Ceropales* Ltr. appeared in 1796 (Préc. Car. Ins.), but without included species, and was not validated until 1802, when Latreille (HN. Crust-Ins. 3)

cited *quinquecinctus* F., associating with it a doubtful species "*campestris?* F." Von Dalla Torre treats *campestris* (L.) F. as a synonym of *mystacea*, but most authors have used the name for a different though closely allied species. If von Dalla Torre is right *Arpactus* Jrn. and *Ceropales* Ltr. were both founded on the same two species, and as *Ceropales* was not validated until after the publication of *Arpactus*, the latter must hold the field.

In 1804, Latreille (Nouv. Dict. HN. **24**) specified *Evania maculata* F. as the Type of *Ceropales*, and proposed *Gorytes* as a new genus with the Type *Mellinus quinquecinctus* F.—it is therefore evident that *Ceropales* Ltr. [1796 *MN.*] (1802) = *Gorytes* Ltr. (1804) the Type of both being the same species *quinquecinctus* F.—another synonym with the same Type is *Hoplisus* Lep. (1832).

In 1807, Jurine (Nouv. Méth. Hym.) added several species to his genus *Arpactus*, figuring one of these (*Arpactus formosus*) and remarking "M. Latreille avait dabord donné aux insectes de ce genre le nom de *Ceropales* qu'il a changé dans la suite contre celui de *Goryte*." Most recent authors, supposing that *Gorytes* was the oldest valid name for *mystaceus*, etc., have adopted it, but have still retained *Arpactus* (or *Harpactus*) in a restricted sense for another group which includes the *Arpactus formosus* figured by Jurine in Nouv. Méth. Hym. 1807 (which however was not one of the original exponents of *Arpactus* Jrn. 1801). But Handlirsch, who is the chief authority on this question, does not consider the differences between the groups of *mystaceus*, *formosus*, etc., to be generic or even subgeneric, and places them all in one genus, which he calls *Gorytes*. Of the original exponents of *Arpactus* 1801 (**mystaceus** L., F., and *quinquecinctus* F.), one, **mystaceus**, belongs to the division now commonly known as "*Gorytes* Ltr. (*sens. strict.*)," the other to *Hoplisus* Lep. If these are to be maintained as genera, or subgenera, the name *Arpactus* could be limited to either of them, since it contained an exponent of each, but not to the group of *formosus*, whereas the name *Ceropales* Ltr. (= *Gorytes* Ltr.) could only be applied to the section containing its original Type (*i. e.* to *Hoplisus* Lep.).

A further difficulty has been created by an extraordinary lapse of memory of Latreille, for after publishing *quinquecinctus* as a *Ceropales* in 1802, he again published it in 1804 under the name *Gorytes*, giving *maculata* as the Type of

Ceropales. In 1810 (Cons-Gén.) Latreille still cited *Evania maculata* F. as the Type of *Ceropales* Ltr., but he designated a different Type for *Gorytes* Ltr., viz. **Mellinus mystaceus** F.! *Evania maculata* F. (and the species associated with it in the new *Ceropales*) belong to a totally different group of the *Hymenoptera*—these are not *Sphegidae* at all but *Psammocharidae* (*Pompilidae*)!

Actually therefore Latreille has erected two genera called *Ceropales*—the earlier a Sphegid, the latter a Psammocharid, and it is in the latter sense that the name is now universally employed—while two different Sphegids were cited by the same author at different times as types of *Gorytes*!

Sphex mystacea L. (= *Mellinus mystaceus* F.) should be adopted as the Type of *Arpactus* Jrn. (= **Gorytes* Ltr., 1810); *Mellinus quinquecinctus* F. as the Type of *Ceropales* Ltr. 1802 (= *Gorytes* Ltr. 1804; = *Hoplisus* Lep. 1832); and *Evania maculata* F. as the Type of **Hypsiceraeus** (ὑψι= high, κεραία = antenna) nn. (= **Ceropales* Ltr. 1804–10).

[Certain precisians will doubtless insist that Shuckard's *Harpactus* is an improvement on Jurine's *Arpactus*, and such ought logically to go further and demand that both should give place to Dahlbom's *Harpactes*. But those who would emend every scientific name which they think open to objection, as an usher corrects the mistakes in a boy's exercises, do not seem to be aware how complex and often difficult of application to special cases the so-called Laws (or rather Principles) which determined the actual formation of new words in Greek and Latin really are, and how endless will be the alterations required in our present Nomenclature if every blemish, or even such blemishes only as any intelligent schoolboy can detect, must be corrected out of hand. Ἁρπακτός (*Arpactus*) may not be good Greek, it may even be impossible, at least in the sense which Jurine meant it to bear. But a Greek would not have felt it to be otherwise than euphonious in itself: and if a neologism satisfies Greek phonetic taste, we need surely ask no more.

It might even be pleaded, that, if we accept the probably exaggerated statements of ancient grammarians, one whole large section of the Dialects which made up "classical Greek" rejected the *spiritus asper* altogether, and that in these, therefore, *Arpactus* would be right and *Harpactus* actually wrong! But, apart from special pleading, we

believe that Entomologists will *generally* be wise, if they are content to keep their own new names as free as possible from glaring eccentricities (*e. g.* the reckless combining in one word of Greek and Latin elements and inflexions), while accepting names published by older authors—unless in the case of obvious misprints—in the forms (whether philologically correct or otherwise) which were given to them when they first appeared in scientific literature from 1758 onwards.]

36

III·21. Alysson Jrn. Erl. Litt-Ztg. **1.** 164.

" Gen. 21 Alysson—Sphex fuscata. Pompilus spinosus Panzer. Pompilus tumidus Panzer."

ALYSSON Jrn. (1801)

= †*Alyson* Jrn. (1807).

Type: **Pompilus spinosus** Pzr. (Pzr. 1806; Jrn. 1807; Crt. 1836; Wstwd. 1840).

Alysson Jrn. Erl. Litt-Ztg. **1.** 164 no. 21 (1801)—[1. **spinosus** Pzr. (= **fuscata* [*nec* F.] Pzr., Jrn.; = *spinosus* Pzr., Jrn.) and 2. *tumidus* Pzr.]; Pzr. Krit. Rev. Ins. Deutsch. **2.** 169–71 (1806) [Type: **spinosus** Pzr. (= **fuscata* [*nec* F.] Pzr. **51**·3; = §*bimaculata* Pzr. **51**·4 ♀; = *spinosus* Pzr. **80**·17 ♂)—*tumidus* Pzr. **81**·15, removed to *Mellinus* (Pzr. l. c. 169)]. †*Alyson* Jrn. Nouv. Méth. Hym. 195–6 no. 21 Pf. **4**·21, **10**·21 (1807)—[Type: **spinosus** Pzr., Jrn. (= †*fucata* Jrn.)—*tumidus* Pzr. removed to *Arpactus* (Jrn. l.c. 194)]; F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 394 (1882); Ltr. Gn. Crust-Ins. **4.** 86–7 no. 504 (1809): Cons-Gén. Crust-Ins. 325, 438 no. 494 (1810); Crt. Br. Ent. **13.** expl. Pl. **584** (1836)—[Type: **spinosus** Pzr. (= §*bimaculatus* Pzr.; Crt.)]; Wstwd. Syn. Gn. Br. Ins. 80 (1840)—[Type: **spinosus** Pzr. Jrn.].

In the Erlangen List (1801) Jurine enumerates under *Alysson* three exponents—*Sphex fuscata*, **Pompilus spinosus** Pzr. and *Pompilus tumidus* Pzr. In 1806, Panzer (Krit. Rev. 169–71) removed *tumidus* Pzr. to *Mellinus*, restricting *Alysson* to *fuscatus* Pzr. and **spinosus** Pzr., and adding *bimaculatus* Pzr.—*fuscatus* Pzr. and *bimaculatus* Pzr. are synonyms of **spinosus** Pzr. which thus became the Type.

In the Nouv. Méth. Hym., Jurine also removed *tumidus* from *Alysson* (†*Alyson*) referring it to *Astatus* (p. 194); he united *bimaculata* Pzr. (**51**·4, ♀) and **spinosa** Pzr. (**80.** 17 ♂) as sexes of the same species; and stated that he only knew *fuscata* Pzr. (†*fucata* Jrn.) from Panzer's figure (**51.** 3), " et que les cellules des ailes soient mal rendues dans le dessin qu'il en a donné, je placerais néanmoins cet

insecte dans ce genre"—Jurine clearly indicates that the Type of *Alysson* Jrn. is **spinosus** Pzr. ♂ (= § *bimaculata* Pzr. ♀).

Two insects have been described as "*Sphex fuscata*," viz. *Sphex fuscata* F. (1793—a Psammocharid, = *rufipes* L.) and "*Sphex fuscata* F.," Pzr. 51·3 (1799). Jurine (Nouv. Méth. Hym. p. 196) shows that he intended the latter—but this **fuscata* Pzr., though adopted by Handlirsch, must sink as a homonym erroneous in adoption. In 1798 Panzer described as a new species *Sphex bimaculata*, without reference to *Sphex bimaculata* Fuessly (1775)—the name § *bimaculata* Pzr., though employed by most authors, including Curtis who cited it as the Type of *Alyson* in 1836, must also sink as a homonym and **spinosus** Pzr. (1801 : *Pompilus*) should be taken as the name of the species.

[This *Alysson spinosus* Pzr. (= *Pompilus spinosus* Pzr., 1801) must not be confounded with the *Crabro spinosus* F. (1775), which is the Type of our next genus *Nysson* Jrn.]

Latreille (Cons. Gén., 1810) includes under *Alyson*, with *fuscata*, a further species, viz. *lunicornis* F. (1798 : *Pompilus*)—but this is a *Didineis*.

[The original spelling of the name of the genus was *Alysson* (Erlangen List, 1801), not †*Alyson*. In the Nouv. Méth. Hym. the name was altered to *Alyson*, but needlessly, not to say incorrectly, for it is evidently formed from *ἀλύσσω* (to fidget), as the following name "*Nysson*" from *νύσσω* (to prick), while †*ἄλυσων* is no Greek word at all.

It will be seen, from the references given below, that *Nysson* first appeared (without type) in the form "*Nysso*"!—but it is to be hoped that this was a mere misprint, and not a blundering attempt to Latinize the participle *νύσσων*.]

37

III·22. Nysson Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 22 Nysson—Crabro spinosus : trimaculat. Ross. Mellin. interruptus. Fabr. Pompil. maculatus. Fabr.

NYSSON Jrn. (1801)

= †*Nysso* Ltr. (1796) MN.

Type: **Sphex spinosus** Forst. (1771) F., (= *tricinctus* F. ; Ltr. 1810).

Nysson Jrn. [= †*Nysso* Ltr. Préc. Car. Ins. 125–6 no. 27

(1796)]. Nysson Jrn. Erl. Litt-Ztg. **1.** 164 no. 22 (1801—[**spinosus** F., *maculatus* F., and two other species]; Ltr. HN. Crust-Ins. **3.** 340 (1802): **13.** 305–7 no. 398 sp, 1–4 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 180, 199 no. 432 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 188–90 (1806); Jrn. Nouv. Méth. Hym. 197–9 no. 22 Pf. **4**·22, **10**·22 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 394 (1882); Ltr. Gn. Crust-Ins. **4.** 90–1 no. 506 (1809); Cons-Gén. Crust-Ins. 321, 438 no. 478 (1810)—[Type: **spinosus** F.(= *tricinctus* F., Ltr.]

The type of *Nysson* was designated by Latreille, in 1810, as *Mellinus tricinctus* F. (1793), which is a synonym of **Sphex spinosus** Forst. (1771) = *Crabro spinosus* F. (1775), one of the species originally included by Jurine in *Nysson*.

38

III·23. **Philanthus** Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 23 Philanthus—Philanthus laetus, arenarius. Crabro labiatus Fab."

[*i. e.* PHILANTHUS F. Skr. NH. Selsk. Kjobnhavn. **1.** 224–5 no. 7 sp. 1–8 (1790): Ent. Syst. **2.** 288–92 no. 154 sp. 1–13 (1793)—**arenarius** L. and five other species.]

PHILANTHUS F. (1790)

= †*Philanthus* F. (1793); =†*Philantus* F. (1793); =*Cerceris* Ltr. (1802).

Type 1: **Sphex arenaria** L. (Jrn. 1801).

Philanthus F. Skr. NH. Selsk. Kjobnhavn. **1.** 224–5 no. 7 sp. 1–8 (1790)—[1. *coronatus* F.; 2. *triangulum* F. (2. *triangulum* F.; = 3. *diadema* F.); 3.(4) *rufipes* F.; 4. *rybyensis* L. (= 5. *ornata* L., F.); 5. **arenarius** L. (6. *arenarius* F.; = 8. *quinquecinctus* F.); 6.(7) *flavipes* F.] †*Philanthus* F. Ent. Syst. **2.** p. v no. 154 (1793). †*Philantus* F. Ent. Syst. **2.** 288–92 no. 154 sp. 1–13 (1793): Sppl. 268–9 (1798). Philanthus Ltr. Préc. Car. Ins. 133–4 no. 26 (1796); Pzr. Fn. Ins. Germ. **46**·2, **47**·23–4 (1797): **63**·9–19, **84**·23–4 (1801); Jrn. Erl. Litt-Ztg. **1.** 164 no. 23 (1801)—[Type: **arenarius** L. (= *laetus* F., Jrn.; = *arenarius* F., Jrn.)—with which Jurine associates *labiatus* F.]; F. Syst. Piez. p. viii, 301–7, Ind. 22–3, no. 57 sp. 1–25 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 171–5 (1806); Jrn. Nouv. Méth. Hym. 200–2 no. 23, (†*Philantus*) Pf. **4**·23, **10**·23 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 394 (1882). **Cerceris* Crt. Br. Ent. **6.** expl. Pl. **269** (1829). [Type: **arenaria** L. (= *laeta* F., Crt.)]; Wstwd. Syn. Gn. Br. Ins. 81 (1840).

[*nec* **Philanthus* Ltr. [Préc. Car. Ins. 133–4 no. 36 (1796) *MN.*]: HN. Crust-Ins. **3.** 366–7 (1802): **13.** 313–4 no. "cccxcxiii" sp. 1–2 (1804–5): Nouv. Dict. HN. **17.** 397–9 (1803): **24.** Tbl. Méth. 181 no. 437 (1804): Gn. Crust-Ins **4.** 95 no. 510 (1809): Cons-Gén. Crust-Ins. 326, 438 no. 496 (1810); Crt. Br. Ent. **6.** expl. Pl. **273** (1829); Wstwd. Syn. Gn. Br. Ins. 81 (1840)—Type:

triangulum F. (= *androgynus* Rossi, Crt.) (SIMBLEPHILUS Jrn.), ante p. 402.]

Type 2: **Sphex rybyensis** L. (= *ornatus* F.; Ltr. 1810).

CERCERIS Ltr. HN. Crust-Ins **3.** 367 (1802)—[1. *arenarius* L., F.; 2. *rufipes* F.; 3. **rybyensis** L. (= *ornatus* F.)]: **13.** 315–8 no. "cccxcxiv." sp. 1–3 (1804–5): Nouv. Dict. HN. **4.** 497–8 (1803): **24.** Tbl. Méth. 181, 199 no. 438 (1804); Jrn. Nouv. Méth. Hym. 201 (1807): Ltr. Gn. Crust-Ins. **4.** 93–5 no. 508 (1809): Cons-Gén. Crust-Ins. 326, 438 no. 495 (1810)—[Type: **rybyensis** L. (= *ornatus* F.)]

Philanthus, in Fabricius' original sense (1790) included (1) *Philanthus* Auctt. (*nec* Jrn.); (2) *Cerceris* Auctt. (= *Philanthus* Jrn.); and (3) *Palarus* Ltr. (= *Gonius* Jrn.) —this will be discussed in the note next following (*vide* p. 411).

The composite genus *Philanthus* F. was revised and analysed in exactly the same way by Jurine and Latreille, and both these authors retained the original name of the genus for one of its divisions, but, unfortunately, not for the same division, so that *Philanthus* has three meanings: *Philanthus* Jrn. + *Philanthus* Ltr. + *Palarus* Ltr. (= *Gonius* Jrn.) together make up *Philanthus* F. Jurine applied the name to the group which contained the greater number of Fabrician species—Latreille, to the group whose species stood first in Fabricius' List. *Philanthus*, as thus limited by Jurine, contains all the species with petiolate second cubital cell; of the rest, he calls one species *Gonius* and the other *Simblephilus*.

Latreille called the species with petiolate second cubital cell *Cerceris*; for *Gonius* he used *Palarus*, and for *Simblephilus* he used *Philanthus*.

Jurine's nomenclature being supposed to have first appeared in 1807 (Nouv. Méth. Hym.) has been universally held to be later than that of Latreille, and the latter has consequently been adopted. The facts however are as follows:—Jurine in the Erlangen List (1801) published *Simblephilus* with a single exponent *Philanthus pictus* Pzr. (i. e. *triangulum* F.)—*Simblephilus* Jrn., therefore, is the *Philanthus* of recent authors. *Gonius* shall be treated under the next heading.

Philanthus of the Erlangen List is published in connection with three names: *Philanthus laetus* and *arenarius*, and *Crabro labiatus* Fab.—the last of these is not an original type of *Philanthus* F., and may be disregarded nomenclatorially—it is however congeneric with the others.

Panzer has figured *laetus* (63·11) and *arenarius* (46·2) in the Fauna Ins. Germ., and the two are apparently identical, equalling *Cerceris arenaria* Auctt.

Latreille, 1802 (HN. Crust. Ins. 3) characterised his *Philanthus* with *coronatus* F., *triangulum* F., and *apivorus* Ltr. as its exponents—(*apivorus* is a synonym of *triangulum*, and *coronatus* a rarer species of the same genus).

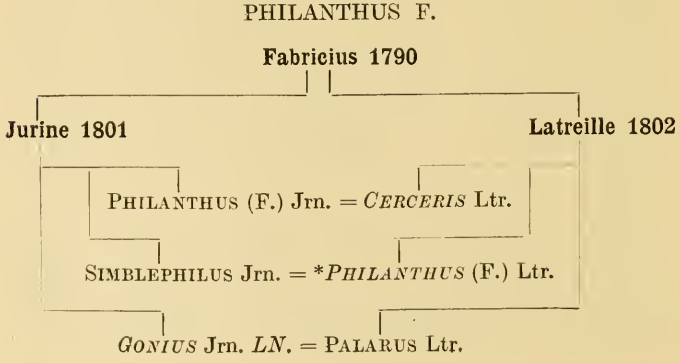
In 1802 Latreille (l.c.) characterised *Cerceris* with exponents *arenarius*, *rufipes*, and *ornatus*; in 1810 (Cons-Gén.) he definitely selected *ornatus* F. (i. e. *rybiensis* L.) as the Type of *Cerceris*.

The results appear to be as follows:—(1) Jurine's revision of *Philanthus* (30. V. 1801) being a year prior to that of Latreille (*after* IV. 1802), his restriction of its possible types to *laetus*, *arenarius*, and *labiatus*, must be accepted. This means that arenaria L. is the Type, for *laetus* is a synonym of *arenarius*, and *labiatus* was not originally included in the Fabrician *Philanthus*.

Rybiensis L. (= *ornata* F.), Latreille's own Type of *Cerceris*, is congeneric with *arenaria* L., and *Cerceris* Ltr. is therefore synonymous with *Philanthus* F., Jrn. (*nec* Ltr.), as noted by Jurine (Nouv. Méth. Hym. 201):—"Mr. Latreille a donné le nom de *cerceris* à nos *philanthes*, en les séparant, avec raison, des autres hyménoptères."

**Philanthus* (F.) Ltr. (*nec* Jrn.) not being available for the genus including *triangulum* F., Jurine's monotypical genus *Simblephilus* (Type: *triangulum* L.) should replace it.

The effect of the revision of *Philanthus* F. by Jurine (1801) and by Latreille (1802) may be shown thus:—



39

III·24. GONIUS Jrn. Erl. Litt-Ztg. **1**. 164.

"**Gen. 24 Gonius**"—[a mere logonym, without exponents].

PALARUS Ltr. (1804–5)

= *GONIUS* Jrn. [1801 *LN.*]; = *PALARUS* Ltr. (1802) *MN.*; = *GONIUS* Pzr. (1806).

Type: **Palarus auriginosus** Eversm. (= * *flavipes* Pzr. **84**·24 (*nec* F.); Ltr. 1804–5).

PALARUS Ltr. [= *GONIUS* Jrn. Erl. Litt-Ztg. 164 no. 24 (1801) *LN.*; = *PALARUS* Ltr. HN. Crust-Ins. **3**. 336 (1802) *MN.*] PALARUS Ltr. (= *GONIUS* Jrn.) Ltr. HN. Crust-Ins. **13**. 296 (1804–5)—[Type: **auriginosus** Eversm. (= * *flavipes* Pnzr., *nec* F.; Ltr.)]. *GONIUS* Pzr. Krit. Rev. Ins. Deutsch **2**. 176–8 (1806)—[Type: **auriginosus** Eversm. (= * *flavipes* Pzr., *nec* F.)]. PALARUS Ltr. Gn. Crust-Ins. **1**. expl. Pf. **14**·1 p. xvi (1806)—[figures **auriginosus** Eversm. (= * *flavipes* Pzr., Ltr., *nec* F.)]. GONIUS Jrn. Nouv. Méth. Hym. 203–5 no. 24 Pf. **4**·24, **10**·24 (1807); F-G. K & K. MT. Schweiz. Ent. Ges. **6**. 394-5 (1882). PALARUS Ltr. Gn. Crust-Ins. **4**. 73–5 no. 495 (1809)—[Type: **auriginosus** Eversm. (= * *flavipes* Ltr.)]: Ltr. Cons-Gén. Crust-Ins. 322, 438 no. 481 (1810).

Jurine, in the Erlangen List (1801) published the generic name *Gonius* without explanation, or assignment to it of species. Latreille, in 1805 (HN. Crust-Ins. **13**. 296–7) stated that Panzer's figure **84**·24 of *Philanthus flavipes* F. represented a *Gonius* Jrn., but added that the real *Philanthus flavipes* F. was a different insect, figured by Coquebert (Ill. Ic. Ins. **2**. Pf. **13**·1). No diagnosis of *Gonius* Jrn. yet existed, one however was given by Panzer in 1806 (Krit. Rev. 176–8) and *flavipes* Pzr. cited as belonging to it. In 1802, Latreille (HN. Crust-Ins. **3**·336) characterised, though without exponents, a genus *Palarus*, and in 1804–5 (l.c. **13**. 296–7) stated that this *Palarus* was identical with Jurine's *Gonius*, and that *Philanthus flavipes* Pzr. belonged to it. Accordingly, the generic names *Palarus* and *Gonius* were provided with a common exponent simultaneously, and in fact in the same sentence—they are therefore absolutely synonymous, and one must be employed to the exclusion of the other. Panzer, in 1806 (Krit. Rev. 176–8) adopted *Gonius*, without allusion to *Palarus*, with whose existence he was probably unacquainted, but all subsequent writers (except Jurine himself, Nouv. Méth. Hym.) have preferred the name *Palarus*, following Latreille, and apparently with reason, since *Palarus* Ltr. had been published with a description as well as a Type by Latreille in

1804–5, while *Gonius* Jrn. remained uncharacterised till 1806.

The specific name "*flavipes* Pzr." however cannot be accepted—*Philanthus flavipes* Pzr. (1801) not being *Philanthus flavipes* F. (1790) was a homonym erroneous in adoption, and could not be revived when the species was transferred to another genus.

According to Kohl and Dalla Torre, **Palarus auriginosus** Evrsm. [Bull. Soc. Imp. Nat. Mosc. **22**. 384–5 (1847)] = **flavipes* Pzr. (*nec* F.). Since there are doubtless good grounds for this identification it may here be accepted. Latreille, when publishing the names *Gonius* and *Palarus*, (HN. Crust-Ins. **13**. 296–7), sank both under *Larra* F., but this error does not affect the status of *Gonius* and *Palarus*. —**Palarus** Ltr. should be adopted, with the Type **auriginosus** Evrsm. (= **flavipes* Pzr., *nec* F.).

40

III·25. **Miscophus** Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 25 Miscophus"—[a mere logonym, without exponents].

MISCOPHUS Jrn. (1807)

= *Miscophus* Jrn. (1801) *LN*.

Type: **Miscophus bicolor** Jrn. (Jrn. 1807; Ltr. 1809).

Miscophus Jrn. [Erl. Litt-Ztg. **1**. 164 no. 25 (1801) *LN*.]: Nouv. Méth. Hym. 206 no. 25 Pf. **4**·25. **11**·25 (1807)—[Type: **bicolor** Jrn. Pf. **11**·25]; F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 395 (1882); Ltr. Gn. Crust-Ins. **4**. 72 no. 493 (1809): Cons-Gén. Crust-Ins. 323, 438 no. 485 (1810).

This monotypical genus, founded on *bicolor* Jrn., dates from 1807, when it was published in the Nouvelle Méthode —in the Erlangen List it was uncharacterised and contained no species.

41

III·26. **Dinetus** Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 26 Dinetus—Crabro pictus. Pompilus guttatus."

DINETUS Jrn. (1801)

Type: **Crabro pictus** F. (Jrn. 1801, 1807; Pzr. 1806; Ltr. 1809–10).

Dinetus Jrn. Erl. Litt-Ztg. **1**. 164 no. 26 (1801)—[1. **pictus** F. (= *pictus* F., Jrn.; = § *guttatus* F., Jrn.)]; Pzr. Krit. Rev. Ins. Deutsch. **2**. 191–3 (1806)—[Type: **pictus** F. ♂ (= *gutattus* F. ♀) Pzr.]; Jrn. Nouv. Méth. Hym. 207–8 no. 26 Pf. **4**·26, **11**·26 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 395 (1882); Ltr. Gn.

Crust-Ins. 4. 72–3 no. 494 (1809): Cons-Gén. Crust-Ins. 323, 438 no. 484 (1810).

Dinetus is a monotypical genus, founded on **Crabro pictus** F. (of which *Sphex guttata* F. is the ♀)—Panzer (Krit. Rev. 193) records that he has, again and again, taken the two forms paired.

42

III·27. CRABRO (F.) Jrn. Erl. Litt-Ztg. 1. 164.

"Gen. 27 Crabro—Crabro."

[*i.e.* CRABRO F. Syst. Ent. 373–6 no. 117 sp. 1–13 (1775): Ent. Syst. 2. p. v, 293–302 no. 155 sp. 1–32 (1793)—**cribraria** L. *etc.*]

CRABRO F. (1775).

[*nec CRABRO* Gffr. (1762) *MN.*]; = THYREOPUS Lep. (1834).

Type: **Sphex cribraria** L. (Lmk. 1801; Ltr. 1810; Crt. 1837; Wstwd. 1840).

CRABRO F. Syst. Ent. [26], no. 117, 373–6 no. 117 sp. 1–13 (1775)—[**cribraria** L. and 12 other species]: Ent. Syst. 2. p. v, 293–302 no. 155 sp. 1–32 (1793): Sppl. 270–1 (1798); Pzr. Fn. Ins. Germ. 3·21 (1793): 15·18–24, 17·19–20 (1794): 46·3–12 (1797): 51·13, 53·14–16 (1798): 62·15–17, 64·13–14, 72·10–12 (1799): 73·18, 78·17 (1800): 83·14–17 (1801): 90·12–13 (1804); Ltr. Prée. Car. Ins. 129–30 no. 32 (1796); Lmk. Syst. An. sans Vert. 270–1 no. 130 (1. 1801)—[Type: **cribraria** L. (*cribrarius* F.)]; Jrn. Erl. Litt-Ztg. 1. 164 no. 27 (V. 1801); Ltr. HN. Crust-Ins. 3. 342 (1802): 13. 322–4 no. "ccexexvi" sp. 1–5 (1804–5): Ltr. Nouv. Dict. HN. 6. 467–70 (1803): 24. 181 no. 440 (1804); F. Syst. Piez. p. viii, 307–13, Ind. 8–9, no. 58 sp. 1–25 (1804); Pzr. Krit. Rev. Ins. Deutsch. 2. 178–84 (1806); Jrn. Nouv. Méth. Hym. 209–12 no. 27 Pf. 4·27, 11·27 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. 6. 395) (1882); Ltr. Gn. Crust-Ins. 4. 80–3 no. 500 (1809): Cons-Gén. Crust-Ins. 324–5, 438 no. 490 (1810)—[Type: **cribraria** L. (= *cribrarius* F., Ltr.)]; Crt. Br. Ent. 15. expl. Pl. 680 (1838)—[Type: **cribraria** L.]; Wstwd. Syn. Gn. Br. Ins. 80 (1840).

[*nec* * *CRABRO* Gffr. Hist. Ins. Paris 2. 261–4 sp. 1–3 (1762) *MN.* § *CRABRO* Gffr-Fourcr. Ent. Par. 2. 361–2 no. 83 sp. 1–4 (1785)—*lutea* L. (CIMBEX)].

Fabricius described *Crabro*, in 1775, for the reception of thirteen species including **cribraria** L. which was specified as the Type by Lamarck in 1801, by Latreille in 1810, Curtis in 1837, and Westwood in 1840. [As a generic name *Crabro* originated with Geoffroy in 1762 (Hist. Ins. Paris), but being published without exponents was invalid *then* and had no definite application until 1785, when Geoffroy (Fourcr. Ent. Paris) enumerated *lutea* L. (= *lunulatus* Gffr.; = *annulatus* Gffr.) and two other species—all

belonging to the genus known as *Cimbex* Olvr. *Crabro* Gffr. (1785) and *Cimbex* Olvr. (1790) are synonyms, but since § *Crabro* Gffr. (1785) is invalid as homonymous with *Crabro* F. (1775), *Cimbex* Olvr. must be accepted as the name of the genus of which *lutea* L. is the Type.]

In recent arrangements of *Crabro* F. (*sens. lat.*) **cribraria** L. is called not a *Crabro*, but a *Thyreopus* Lep. (following Lepeletier 1834), the name *Crabro* (*sens. strict.*) being reserved for another group (*formosus* Auctt., *etc.*)—before saying more we await Kohl's forthcoming Monograph of the *Crabronidae*, merely suggesting that *Crabro* F. should not be separated from its Type **cribraria** L.

43

III·28. **Cemonus** Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 28 Cemonus—Crabro unicolor Panzer."

CEMONUS Jrn. (1801)

= *Pemphredon* Ltr. ([1796, *MN*] 1802), †*Empredon* Ltr. (1804).

Type: **Crabro lugubris** F. (= *unicolor* Pzr.; Jrn. 1801).

Cremonus Jrn. [= *Pemphredon* Ltr. Préc. Car. Ins. 128–9 no. 30 (1796) *MN.*]. Cemonus Jrn. Erl. Litt-Ztg. **1.** 164 no. 28 (1801)—[Type: **lugubris** F. (= *unicolor* Pzr.; Jrn.)] *Pemphredon* Ltr. HN. Crust-Ins. **3.** 341–2 (1802)—[1. **lugubris** F.; 2. *leucostoma* L., F.]: **13.** 325 no. "ccexcxvii" (1804–5)—[Type: **lugubris** F. (*unicolor* Pzr. **52**·**24**)]: Nouv. Dict. HN. **17.** 222 (1803): (†*Empredon*) **24** Tbl. Méth. 181, 199 no. 441 (1804)—[Type: **lugubris** F.]; F. Syst. Piez. p. xi, 314–6 no. 59 sp. 1–9 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 186–7 (1806). Cemonus Jrn. Nouv. Méth. Hym. 213–4 no. 28 Pf. **4**·28, 11·28 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 395 (1882). *Pemphredon* Ltr. Gn. Crust-Ins. **4.** 83–4 no. 501 (1809): Cons-Gén. Crust-Ins. 325, 438 no. 492 (1810)—[Type: **lugubris** F. (= *unicolor* Jrn.; Ltr.); Crt. Br. Ent. **14.** expl. Pl. **632** (1837). Cemonus Wstwd. Syn. Gn. Br. Ins. 81 (1840).

Panzer, Fauna Ins. Germ. (**52**·24), figures as *Crabro unicolor* (but describes as *Sphex unicolor*), an insect, which in Krit. Rev. (186–7), he states to be a *Cemonus* Jrn., and identical with *Pemphredon lugubris* F. (Syst. Piez. 315). The neuration of his figure is so obviously incorrect that no conclusion can safely be drawn from it, nor in characterising *Cemonus* in the Krit. Rev. (186–7) does Panzer mention the neuration at all. The *true* neuration of "*unicolor* Pzr." the Type of *Cemonus* is correctly given by Jurine on Plate **4** fig. 28—one of the Plates which had

been sent for inspection to the writer of the Erlangen Article —and confirms Panzer's statement, in the Kritische Revision, that his *unicolor* was the **lugubris** of Fabricius. This species is at present known as a *Pemphredon* Ltr., being in fact the Type designated for that genus by its author in 1804–5, and again (under the name *Cemonus unicolor* Pzr.) in 1810. *Cemonus* and *Pemphredon* are therefore synonyms, with the common Type **lugubris** F. (= *unicolor* Pzr.), on the authority of Panzer, Latreille, and also Jurine. The name *Cemonus* Jrn. has validity as against *Pemphredon* Ltr., because it was published as a monotypical genus in May 1801, whereas *Pemphredon* Ltr., though the name itself appeared earlier (viz. in 1796), received no species until 1802, when **lugubris** F. and *leucostoma* F. were made exponents of it.

[The name *Cemonus* is still sometimes used rather as subgeneric than as generic, unfortunately in connection with a group not containing **lugubris**, but containing several other species, two of which till lately were not distinguished and together were called *unicolor*. This "*unicolor*" was a homonym of "*Crabro unicolor* Panzer" (= **lugubris** F.), and should therefore be discarded—as in practice it has already been.]

44

111·29. **Oxybelus** Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 29 Oxybelus—Crabro lineatus, uniglumis, biglumis."

OXYBELUS Jrn. (1801)

= *Oxybelus* Ltr. (1796) *MN*.

Type: **Vespa uniglumis** L. (Ltr. 1802, 1804, 1810; Crt. 1833; Wstwd. 1840).

Oxybelus Jrn. [Ltr. Préc. Car. Ins. 129 no. 31 (1796) *MN*]: Jrn. Erl. Litt-Ztg. **1**. 164 no. 29 (1801)—[1. *lineatus* F.; 2. **uniglumis** L., F.; 3. *biglumis* L.]; Ltr. HN. Crust-Ins. **3**. 342–3 (1802)—[Type: **uniglumis** L.]: **13**. 307–8 no. 399 sp. 1–3 (1804–5): Nouv. Dict. HN. **24**. Tbl. Méth. 180, 199 no. 433 (1804); F. Syst. Piez. p. viii, 316–8, Ind. 21, no. 60 sp. 1–7 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 190–1 (1806); Jrn. Nouv. Méth. Hym. 216–7 no. 29 Pf. **4**·29, **11**·29 (1807); Pzr. Fn. Ins. Germ. **101**·19 (1809); Ltr. Cons-Gén. Crust-Ins. 324, 438 no. 489 (1810)—[Type: **uniglumis** L.]; Crt. Br. Ent. **10**. expl. Pl. **480** (1833); Wstwd. Syn. Gn. Br Ins. 79 (1840).

Oxybelus was published by Latreille in 1796, but without associated species, and was first validated by Jurine in 1801 (Erlangen List). Jurine gave three exponents, and

one of these, *uniglumis* L., was cited as type by Latreille (1802–10), by Curtis (1833), and by Westwood (1840).

Biglumis L. is more or less a mystery; it is generally explained as a form of *Polistes*, but Jurine evidently interpreted it otherwise.

45

111·30. Prosopis Jrn. Erl. Litt-Ztg. 1. 164.

"Gen. 30 Prosopis—Sphex annulata, signata Panzer. Hylaeus annulatus Fab. Mellinus atratus Fab. inedit."

HYLAEUS F. (1793)

= Prosopis Jrn. 1801; †*Hylaeus* Wlknr. (1802).

Type 1: **Apis annulata** L. (= *Hylaeus annulatus* F.; Ltr. 1802, 1804, 1810; Crt. 1831; Wstwd. 1840).

Hylaeus F. Ent. Syst. 2. pp. vi, 302–7 no. 156 sp. 1–16 (1793)—[Sixteen species, including 12 **annulata** L. (*Apis annulata* L. = *Hylaeus annulatus* F.]; Ltr. Préc. Car. Ins. 136 no. 39 (1796); Pzr. Fn. Ins. Germ. 7·15 (1796): **46**·13–14 (1797): **53**·17–18, **55**·2–4 (1798): **64**·15 (1799); F. Sppl. Ent. Syst. 272 (1798); Wlknr. Fn. Par. Ins. 2. p. vi, 100–2 no. 24 sp. 1–3 (1802); Ltr. HN. Crust-Ins. 3. 370, 372 (1802)—[Type: **annulata** L. (= *annulatus* F., Ltr.)]: **13.** 360–1 no. 407 sp. 1–3 (1804–5): Nouv. Dict. HN. **11.** 494–6 (1803): **24.** Tbl. Méth. 182, 199 no. 451 (1804)—[Type: **annulata** L.]: Gn. Crust-Ins. **4.** 149–50 no. 541 (1809): Cons-Gén. Crust-Ins. 331, 438 no. 508 (1810)—[Type: **annulata** L.]; Crt. Br. Ent. **8.** expl. Pl. **373** (1831)—[Type: **annulata** L.]; Wstwd. Syn. Gn. Br. Ins. 84 (1840).

Fabricius [Syst. Piez. 293 no. 55 sp. 1, Ind. 14, 25, (1804)] removed **annulata** L. to *Prosopis*, but Latreille had already cited this species as the Type of *Hylaeus* F., in 1802, and it was again cited by Latreille in 1804–5, and 1810, as also by Curtis, in 1831, and by Westwood, in 1840.

Type 2: **Sphex signata** Pzr.

Prosopis Jrn. Erl. Litt-Ztg. **1.** 164 no. 30 (1801)—[**Sphex signata** Pzr. (= *annulata* Pzr. **53**·1 ♂; = *signata* Pzr. **53**·2 ♀); *Apis annulata* L. (= *Hylaeus annulata* F.); *Mellinus atratus* F. *LN.*] F. Syst. Piez. p. xi, 293–6, Ind. 25, no. 55 sp. 1–14 (1804); Pzr. Fn. Ins. Germ. **89**·14 (1804): **105**·15 (1809): Krit. Rev. Ins. Deutsch. **2.** 161–3 (1806); Jrn. Nouv. Méth. Hym. 218–20 no. 30 Pf. **4**·30, **11**·30 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 395–6 (1882)—[**signata** Pzr. should be taken as the Type].

[*nec* **Hylaeus* Cvr. Tbl. Elem. HN. 493–4 (1797–8)—*glutinans* Cvr. (Colletes Ltr.)].

[*nec* **Hylaeus* F. Syst. Piez. p. xiii, 319–21 no. 61 sp. 1–8, Ind. 14 (1804)—*sexcinctus* F. (Halictus Ltr.)].

The Erlangen List enumerates under *Prosopis*:—1. *Sphex annulata*; 2. *signata* Panzer; 3. *Hylaeus annulatus* Fab.; 4. *Mellinus atratus* Fab., *inedit.*

This "*Sphex annulata*" cannot possibly be the Fabrician *Sphex annulata* F. [Sppl. Ent. Syst. 245 (1798); Coq. Ill. Ic. Ins. **2**·51 Pf. **12**·4 (1801)], which is a highly coloured *Cryptocheilus* Pzr. (= § *Salius* F.)—a *Psammocharid.*

Mellinus atratus may also be set aside as a species then undescribed. Panzer has figured a *Sphex annulata* Pzr. (**53**·1) and a *Sphex signata* Pzr. (**53**·2)—the former a ♂, the latter a ♀, both certainly belonging to *Prosopis* Auctt. Neither shows any trace of lateral white hairs on the first abdominal segment, or of yellow streaks on the pronotum, etc.—it is probably impossible to identify either with certainty, but there is no reason to say that the former is not the ♂ of *annulata* L. (= *communis* Auctt.), and the latter the ♀ of *signata* Auctt. (= *bipunctata* F., *sec* Dalla Torre), except that *signata* has white hairs on the first abdominal segment laterally which do not appear in Panzer's figure. In 1807 Jurine figures *Prosopis bifasciatus* (sic) as representative of his genus, but this was not one of the species which he listed in 1801.

[It should be noted that the name "*Sphex bimaculata*" is associated with the diagnosis of *Sphex signata* Pzr. (**53**·2), but evidently by mistake, since Panzer published *Sphex bimaculata* as a species **51**·4.]

The genus *Hylaeus* was first published by Fabricius, in 1793, for the reception of sixteen species, including *annulata* L. *Prosopis* hitherto has not been traced to an earlier date than 1807 (Nouv. Méth. Hym.), but the Erlangen List carries it back to 30 May 1801—even so, however, *Hylaeus* F. (1793) is by far the older name, and, if the two genera be identical, *Hylaeus* having always had priority cannot now be discarded. We come to this decision with considerable regret, quite agreeing with Latreille [Gen. Crust-Ins. **4**. 149–50 (1809)] that the genus *Hylaeus* F. was "characteribus incertis fulcitum et specierum complexione maxime discordans," and that the genus *Prosopis* had been treated by Fabricius with equal infelicity, to which we must add that *Prosopis* Jrn. is a genus, which, apart from the name, fulfils every requirement of modern science.

The Type of *Hylaeus* F. was cited by Latreille (1802, etc.) as *Hylaeus annulatus* F.; the Type of *Prosopis* Jrn. should be either the same species, or that which Jurine figured

to represent it in Nouv. Méth. Hym., viz. *signata* Pzr. (= *bifasciatus* Jrn. Pf. 11·30). Jurine agrees that *Hylaeus* and *Prosopis* are identical—**signata** Pzr. 53·2 (= *bifasciatus* Jrn. Pf. 11·30) should be cited as the Type of *Prosopis* Jrn. (1801) which will sink as synonymous with the earlier genus *Hylaeus* F. (1793).

46

III·31. **Nomada** (F.) Jrn. Erl. Litt-Ztg. **1.** 164.
"Gen. 31 Nomada—Nomada ruficornis, etc."
[*i. e.* NOMADA Scp. Ann. HN. **4.** 44–7 no. 3 sp. 1–8 (1770); F. Syst. Ent. 388–90 no. 120 sp. 1–7 (1775): Ent. Syst. **2.** pp. vi, 345–9 no. 160 sp. 1–15 (1793)—**ruficornis** L., *etc.*]

NOMADA Scp. (1770)

Type 1 : **Apis ruficornis** L. (Jrn. 1801 ; Ltr. 1802).

Nomada Scp. Ann. HN. **4.** 44–7 no. 3 sp. 1–8 (1770)—[**ruficornis,** L. and seven other species]: F. Syst. Ent. pp. [27], 388–90 no. 120 sp. 1–7 (1775)—[**ruficornis** L., etc]: Ent. Syst. **2.** pp. vi, 345–9 no. 160 sp. 1–15 (1793); Ltr. Prée. Char. Ins. 137–8 no. 41 (1796); Pzr. Fn. Ins. Germ. 32·7 (1796): 53·20–4, 55·18–24 (1798): 61·20, 62·18, 72·17–21 (1799): 78·20 (1800): 96·20–2 (1804); Jrn. Erl. Litt-Ztg. **1.** 164 no. 31 (30. V. 1801)—[Type: **ruficornis** L., F.]; Ltr. HN. Crust-Ins. **3.** 370, 375 (1802)—[Type: **ruficornis** L.]: 14·49–50 no. 417 sp. 1–2 (1804–5); F. Syst. Piez. pp. xiii, 390–5, Ind. 20, no. 76 sp. 1–19 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 234–9 (1806); Jrn. Nouv. Méth. Hym. 221–3 no. 31, Pf. 4·31, 11·31 (1807); Ltr. Gn. Crust-Ins. **4.** 169–70 no. 561 (1809); Crt. Br. Ent. **9.** expl. Pl. 419 (1832)—[Type: **ruficornis** L.]; Wstwd. Syn. Gn. Br. Ins. 85 (1840).

Type 2: **Apis fabriciana** L. (Ltr. 1810).

*Nomada Ltr. Cons-Gén. Crust-Ins. 338, 439 no. 528 (1810)—[Type: **fabriciana** L.].

[*nec* **Nomada* Lmk Syst. An. sans Vert. 274 no. 136 (I. 1801) —*variegata* L. (**Epeolus** Ltr.)—this was not one of the original types of Scopoli (1770), but it was included in *Nomada* by Fabricius (1775)].

Nomada was founded by Scopoli, in 1770, on eight species named as follows:—1. *riparia* Scp.; 2. *succincta* Scp.; 3. *squalida* Scp.; 4. *rufescens* Scp.; 5. *ruficornis* Scp.; 6. *ranunculi* Scp.; 7. *praecox* Scp.; 8. *nasuta* Scp.

Of these *succincta* is stated by Fabricius to be *gibba* F. (a *Sphecodes*); *squalida* is said by Gmelin to be larger than *gibba*, with antennae twice as long (perhaps *gibba* F. was a ♀, and *squalida* Scp. a ♂); Gmelin adds that *ranunculi* Scp. has the segments of the abdomen red at the margin on each side; that *nasuta* Scp. has an oblong abdo-

men, porrect, blunt maxillae (*i. e.* mandibles) and a bristle-shaped tongue (*i. e.* probably an *Apis* in the sense of Kirby, perhaps a *Chelostoma*); *praecox* Scp. is generally supposed to be the *Andrena* so-called by recent authors (*sec.* Dalla Torre Cat., etc.).

Lamarck, in 1801, (Syst. An. sans Vert. 136) cited *Apis variegata* L. (an *Epeolus* Ltr.) as the Type of *Nomada* F.—this species was included in those enumerated by Fabricius, but did not occur among Scopoli's types.

In 1775, Fabricius described a genus *Nomada*, without allusion to *Nomada* Scopoli. Were *Nomada* F. and *Nomada* Scp. the same genus? If not, *Nomada* F., one of the oldest and most universally adopted of all generic names must sink as a homonym—yet it is very difficult to answer the above question positively in the affirmative. Fabricius' original genus consisted of seven species, of which only two (*ruficornis* and *fabriciana*) belong to *Nomada* as at present accepted.

There is a *ruficornis* among Scopoli's species, but J. L. Christ [Naturg. Class. Ins. 161 (1791)], after briefly describing *Nomada ruficornis* Scp., says that Fabricius describes a "Verschiedenheit" (Variety ?) as *Nomada ruficornis*, and, mentioning *inter alia*, that Fabricius' species has the thorax marked with red, and the abdomen with yellow—these characters, apparently, not existing in Scopoli's insect. The latter, however, seems to be a *Nomada* in the modern sense (not, as might be suggested, a *Sphecodes*), since the antennae, labrum, and parts of the legs are said to be red. If *ruficornis* Scp. and *ruficornis* F. are conspecific (*i. e.* different sexes, or varieties, of the same insect) the Type of *Nomada* Scp. is fixed, since Fabricius includes this species in his genus, of which it is cited as the Type by Latreille (1802), Curtis (1832), and Westwood (1840). It is clear at any rate that if any species of *Nomada* Scp. can be identified with a *Nomada* in the modern sense, that species ought to be treated as the Type of Scopoli's genus—otherwise needless and intolerable confusion will be introduced into our Lists.

47

III·32. ANDRENA (F.) Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 32 Andrena—Andrena succincta, bicolor. Andrena (Nomad. Fabr. inedit) lobata Panzer. Nomada gibba Fabr. Andrena musciform. Ross. (Nomada Nigrita Fabr. inedit.)

*** Bullae alarum in Nomadis et Andrenis semper reperiuntur in nervis cubitalibus et recurrentibus."**

[*i.e.* ANDRENA F. Ent. Syst. [26], 376–8 no. 118 sp. 1–14 (1775): Ent. Syst. **2.** pp. vi, 307–14 no. 157 sp. 1–31 (1793)—**succincta** L., *bicolor* F., etc.]

ANDRENA F. (1775)

Type 1: **Apis succincta** L. [*nec* Ltr., *nec* Auctt.] (Lmk. 1801).

ANDRENA F. Syst. Ent. [26], 376–8 no. 118 sp. 1–14 (1775)—[4. *bicolor* F.; 14. **succincta** L., and twelve other species]: Ent. Syst. **2.** pp. vi, 307–14 no. 157 sp. 1–31 (1793); Pzr. Fn. Ins. Germ. **7**·10 (1793): **7**·13, (2 edn.) **35**·22 (1796): **46**·15–17 (1797): **53**·19, **55**·5, **56**·1–3 (1798): **64**·16–20, **65**·18–20, **70**·22, **72**·15–16 (1799): **74**·10 (1801): **85**·15, **90**·14–15, **94**·10–11 (1804): **97**·18–19, **107**·14 (1809); Ltr. Préc. Car. Ins. 136–7 (1796); Lmk. Syst. An. sans Vert. 272 no. 133 (I. 1801)—[Type: **succincta** L.]; Jrn. Erl. Litt-Ztg. **1.** 164 no. 32 (30. V. 1801).

[*nec* COLLETES Ltr. HN. Crust-Ins. **3.** 372 (1802): **13.** 359 no. 406 (1804–5): Nouv. Dict. HN. **24.** 181–2, 199 no. 450 (1804); Ltr. Cons-Gén. Crust-Ins. 331, 438 no. 507 (1810)—Type: **glutinans** Cvr. (= * *succincta* [*nec* L.] Ltr.)].

Type 2: **Apis cineraria** L. (Ltr. 1810).

ANDRENA* Ltr. HN. Crust-Ins. **3. 372–3 (1802): **13.** 362–4 no. 408 sp, 1–4 (1804–5): Nouv. Dict. HN. **24.** Tbl. Méth. 182 no. 452 (1804); Jrn. Nouv. Méth. Hym. 227–31 no. 32 Pf. **4**·32, **11**·32 (1807); Ltr. Gn. Crust-Ins. **4.** 150–1 no. 652 (1809): Cons-Gén. Crust-Ins. 332, 439 no. 510 (1810)—[Type: **cineraria** L., F.]; Wstwd. Syn. Gn. Br. Ins. 84 (1840).

Type 3: **Andrena bicolor** F.

ANDRENA* Pzr. Krit-Rev. Ins. Deutsch. **2. 193–204 (1806).

Type 4: **Melitta nitida** Kby (Crt. 1826).

ANDRENA* Crt. Br. Ent. **3. expl. Pl. **129** (1826)—[Type: **nitida** Kby.].

Lamarck, in January 1801, made *succincta* L. the Type of *Andrena*. Latreille, in 1802, also cited *succincta* L. as a type, but of another genus, viz. *Colletes* Ltr. At first sight it might appear that *Colletes* Ltr. would consequently have to become a synonym of *Andrena* F. (isogenotypic), but before so deciding it will be wise to consult the original description of *succincta* L. [Syst. Nat. (ed. **10**) **1.** 576]. The character there mentioned which at once arrests attention is "*rostrum subulatum*"—this in our judgment makes it perfectly certain, that whatever *succincta* L. was, it was not a *Colletes*. In *Colletes* the tongue is short, broad, and bifid at the apex—"*subulatum*" is of all possible words *least* applicable to it! Next we note that *succincta* has four white bands (presumably four only) on the abdomen, whereas *Colletes* species generally have all the segments

banded. Linné's description can only refer to one of the *Acutilingues* (such as *Andrena* F., *Halictus* Ltr., and *Cilissa* Leach)—of these, *Cilissa* has an extremely subulate tongue; *Halictus* also one which is distinctly subulate; and *Andrena* one, which as compared with that of *Colletes* might be called so. Yet there seems no doubt that Linné named and placed in his cabinet as *succincta* a specimen of *Colletes*. Kirby, in 1800, saw this specimen, and noticed at once that the tongue did not agree with Linné's description. Nylander also (about 1850) examined the specimen, and has stated that it was a *Colletes*, not however the insect now commonly called *succincta*, but a specimen of *fodiens* Geoffr-Fourcr. Kirby and Latreille were in correspondence about this insect, and it is quite certain that to both these authors "*succincta*" meant the species so-named in the Linnean cabinet, viz. a *Colletes*, and not an *Andrena*. But Lamarck's *Andrena succincta* F. (*Apis succincta* L.) was as certainly not a *Colletes*, for his diagnosis of the genus states expressly "Machoires et langue fort allongées"—plainly, therefore, reckoning it among the *Acutilingues*. The designation therefore of *succincta* L. as Type of *Andrena*, in the modern sense, may be accepted until it is shown for certain that the insect really described by Linné (NB.—not the specimen in his Cabinet!) was not, after all, a *Halictus* (such as *quadricinctus* F.), or a *Cilissa* (such as *leporina* Pzr.).

Colletes Ltr. being a good genus, and not a synonym of *Andrena* F., therefore stands, but the species which is its Type must not be called *succincta*. Latreille, as Kirby tells us, sent the species to him with the name "*glutinosus*"—this was published by Cuvier as *Hylaeus glutinans* (*Apis glutinans*)—Tbl. Element. HN. 493–4 (An. VI.= 1797–8), and is mentioned as a synonym of *Colletes succincta* by Latreille (HN. Crust-Ins. **13**. 355, 359). The species should be known as **Colletes glutinans** Cuvier (= **succincta* [*nec* L.] Ltr.).

48

III·33. **Lasius** Jrn. Erl. Litt-Ztg. **1. 164.**

"Gen. 33 Lasius—Apis quadrimaculata Panzer."

[*nec* §*Lasius* F. Syst. Piez. pp. xi, 415–8, Ind. 18, no. 78 sp. 1–10 (1804)].

LASIUS Jrn. (1801)

= Podalirius Ltr. (1802); = *Anthophora* Ltr. (1803); = *Megilla* F. (1804).

Type 1: **Apis quadrimaculata** Pzr. (Jrn. 1801).

LASIUS Jrn. Erl. Litt-Ztg. **1.** 164 no. 33 (30 V. 1801)—[Type: **quadrimaculata** Pzr.]; Pzr. Fn. Ins. Germ. **86**·16, **89**·15 (1804); Jrn. Nouv. Méth. Hym. 235–8 no. 33 Pf. **4**·33, **11**.33 (1807): F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 397 (1882).

Type 2: **Apis pilipes** F. (Ltr. 1810).

PODALIRIUS Ltr. HN. Fourmis etc. 430–1 (IV. 1802)—[1. *rotundata* F.; 2. *retusa* L. (= *acervorum* F., Ltr.); 3. **pilipes** F. [*pilipes* F. (1775) ♂; = *hirsuta* F. (1787) ♀]; 4. *versicolor* F.; 5. *crassipes* F.; 6. *lanipes* F.]: HN. Crust-Ins. **3.** 371, 378–9 (1802)—[**pilipes** F.; *versicolor* F.; *crassipes* F.]. = *ANTHOPHORA* (nn.) Ltr. Nouv. Dict. HN. **18.** 167–9 (1803): **24.** Tbl. Méth. 183, 199 no. 458 (1804) ["Voyez Podalirie": 1. **pilipes** F. (= *hirsuta* F., Ltr.); 2. *versicolor* F.]: HN. Crust-Ins. **13.** 375–7 (1804–5) ["*Anthophore*—mot substitué à celui de *podalirie* que Lamarck avoit déjà donné à un genre de plante"]: **14.** 45–8 no. 414 sp. 1–3 (1804–5) [*anthophore*, = *podalirie*, = *lasius* Pzr.]: Gn. Crust-Ins. **4.** 174–6 no. 567 (1809): Pzr. Fn. Ins. Germ. **99**·16, **105**·18–9; **106**·19 (1809): Cons-Gn. Crust-Ins. 340, 439 no. 537 (1810)—[Type: **pilipes** F.]. *MEGILLA* F. Syst. Piez. pp. xiii, 328–35 no. 63 sp. 1–33 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 193, 207–9, 224–7, 227–9, 246–7, 257, 260 (1806).

Type 3: **Apis parietina** F. (Ltr. 1804).

ANTHOPHORA Ltr. An. Mus. HN. Paris **3.** 251–9 Pf. **22**·1A–D (II·1804)—[*parietina* F.—not an original Type].

Type 4: **Apis retusa** L. (Crt. 1831).

ANTHOPHORA Crt. Br. Ent. **8.** expl. Pl. **357** (1831)—[Type: **retusa** L.].

Lasius Jrn. of the Erlangen List (1801) is a monotypical genus founded on *Apis quadrimaculata* Pzr. **56**·7 (= §*vulpina* Pzr. **56**·6, Jrn.)—both these names were published together in 1798. Dalla Torre lists the species as "*Podalirius vulpinus* Pzr.," treating *quadrimaculata* Pzr. as a synonym, but §*Apis vulpina* Pzr. (1798) is invalid, being homonymous with *Apis vulpina* Christ (1791)—the species should therefore be known as *Lasius quadrimaculatus* Pzr.* Later, and therefore unavailable, synonyms of *Lasius* Jrn. (1801) are *Podalirius* Ltr. (1802), *Anthophora* Ltr. (1804–5) and *Megilla* F. (1804)—Panzer adopted the last of these in the Krit. Rev (1806).

Until recently *Lasius* Jrn. was almost universally called *Anthophora* Ltr., but in Dalla Torre's Catalogue (1896), and immediately after in Friese's Monograph of the genus (1897), *Podalirius* Ltr. has been restored—Friese applying

* *Apis vulpina* Christ is utterly unlike *Lasius quadrimaculatus* Pzr. (= *Apis vulpina* Pzr.)—it may possibly be = *parietina* F., if Palaearctic (but the locality is not stated).

the name both to the genus as a whole, and also (*sensu stricto*) to a section.

In the Systema Piezatorum Fabricius made use of Jurine's name *Lasius*, but applied it to a genus of Ants which he separated from *Formica* L., and later authors have ignored Jurine's *Lasius*, no doubt because the publication of the Piezatorum (1804) antedates that of the Nouvelle Méthode (1807). But the real date of *Lasius* Jrn., as we now learn, is May 30, 1801 (Erlangen List)—§*Lasius* F. (1804) therefore sinks as a homonym of the earlier *Lasius* Jrn.

A new name for §*Lasius* F. is necessary, there being, apparently, no existing synonym, we therefore propose that it be called **Donisthorpea** in recognition of Mr. H. St.J. K. Donisthorpe's careful investigations into the bionomics of this and other Heterogynous genera.

Donisthorpea, nn.

Type: **Formica nigra** L. (= *Lasius niger* F.).

= §*Lasius* F. Syst. Piez. pp. xi, 415–8 no. 78 sp. 1–10, Ind. 18 (1804); Auctt.—[*nec* Lasius Jrn. (1801)]).

49

III·34. Crocisa Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 34 Crocisa—Apis punctata. Nomada scatellata. Andrena armata Panzer."

CROCISA Jrn. (1801)

= *Thyreus* Pzr. (1806).

Type 1: **Melecta histrionica** Illig. (=**scutellaris* [nec F.] Pzr.; Ltr. 1810—[=†*scatellata* Jrn.]).

Crocisa Jrn. Erl. Litt-Ztg. **1**. 164 no. 34 (30. V. 1801). [1. *punctata* F. (*punctata* F. 1775, Jrn.; = *armata* Pzr. 1799, Jrn.); 2. **histrionica** Illig. (=**scutellaris* [*nec* F.] Pzr.; †*scatellata* Jrn.)]. *Thyreus* Pzr. Krit. Rev. Ins. Deutsch. **2**. 263–4 (1806)—[Type: **histrionica** Illig. (=**scutellaris* [*nec* F.] Pzr.)]. Crocisa Jrn. Nouv. Méth. Hym. 239–41 no. 34 Pf. 4·34, 12·34 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 397 (1882); Ltr. Gn. Crust-Ins. **4**. 172 no. 565 (1809): Cons-Gn. Crust-Ins. 338, 439 no. 532 (1810)—[Latreille's generic description excluded *punctata* F. (the Type of Melecta Ltr.) and consequently restricted Crocisa to **histrionica** Illig. (=**scutellaris* Pzr.) which thus became the Type—**histrionica** Illig. is congeneric with *histrio* F. which was not an original type].

[NB. **Crocisa histrionica** Illiger.—*Melecta histrionica* Illig. Mag. Ins. **5**. 99 sp. 10 (1806). = *Nomada *histrio?* (*nec* F.) Rossi Fn. Etrusc. **2**. 110 sp. 930 (1790). = *Nomada *scutellaris* (*nec* F.) Pzr. Fn. Ins. Germ. 32·7 (1796). = *Nomada* †*scatellata* Jrn. Erl. Litt-Ztg. **1**. 164 no. 34 (1801).]

Type 2: **Melecta histrio** F. (Ltr. 1810).

CROCISA Ltr. Cons-Gen. Crust-Ins. 338, 439 no. 532 (1810)—[Type: **histrio** F.—this was not an original type, but is congeneric with **histrionica** Illig., the Type as shown above.]

The names *Crocisa* Jrn. and *Melecta* Ltr. were originally given to the same generic conception, but as they are now restricted to different types it will be convenient to print the history of *Melecta* for reference.

MELECTA Ltr. (1802)

Type: **Apis punctata** F. (Ltr. 1802–10; Crt. 1826).

MELECTA Ltr. HN. Fourmis etc. 427 (IV. 1802)—[Type: *punctata* F. (with which are associated *histrio* F. and *scutellaris* F.): HN. Crust-Ins. **3.** 370, 376 (1802)—[**punctata** F., and *histrio* F.]: Nouv. Dict. HN. **14.** 249–50 (1803): **24.** 183, 199 no. 459 (1803)—[Type: **punctata** F.]; F. Syst. Piez. pp. xiii, 385–7 no. 74 sp. 1–7, Ind. 19 (1804); HN. Crust-Ins. **14.** 48 no. 415 (1804–5)—[Type: **punctata** F. (Pzr. **35**·23, **70**·22)]: Gn. Crust-Ins. **4.** 171–2 no. 564 (1809): Cons-Gn. Crust-Ins. 338, 439 no. 533 (1810); Pzr. Fn. Ins. Germ. (2 edn.) **32**·7, **35**·23 (1810?); Crt. Br. Ins. **3.** 125 (1826); Wstwd. Syn. Gn. Br. Ins. 85 (1840).

The name *Crocisa* was first published in the Erlangen List. Of the three specific names included under it, two (*punctata* and *armata*) are synonyms and denote the species described by Fabricius (1775) as *Apis punctata* (= *Melecta armata* Pzr., of Dalla Torre's Catalogue). The third name "*Nomada scatellata*" (sic) is evidently intended for the "*Nomada scutellaris* Fab." figured by Panzer (Fn. Ins. Germ. **32**·7) as shown by Jurine (Nouv. Méth. Hym. 241).

Illiger (1806) recognised that the *scutellaris* of Panzer was not the true *scutellaris* of Fabricius, and renamed Panzer's species **histrionica** Illiger.

The genus *Crocisa* then was founded on two species, viz. *punctata* F. and *histrionica* Illig., one of which must be its Type.

In 1802 Latreille published his genus *Melecta* for *punctata* F., with which he associated *histrio* F. and *scutellaris* F. (HN. Fourmis etc.). Later in the same year he again used *Melecta* to include *punctata* and *histrio* but omitted *scutellaris*, and in 1803 he cited *punctata* F. as the Type of *Melecta* Ltr.

In 1809–10 Latreille definitely broke up the genus which he had formerly called *Melecta* into two genera, viz. *Melecta* Ltr. and *Crocisa* Jrn., distinguishing them on the same characters by which we still separate them (viz.

the number of joints of the maxillary palpi, and the structure of the scutellum—bidentate in *Melecta*, emarginate in *Crocisa*. As before he cites *punctata* F. as the Type of *Melecta*; for *Crocisa* he cites as Type *histrio* F., which however was not one of the original exponents of the genus, though included in it later in the Nouvelle Méthode. His description of *Crocisa* so limits that genus as to exclude from it *punctata* F., and thereby makes *histrionica* Illiger (= "*Nomada scutellata*" of the Erlangen List) its only possible Type.

Note on **Nomada scutellaris** F. Sp. Ins. **1.** 487 (1781)—*nec* Pzr.

Fabricius described "*Nomada scutellaris*" saying of it "Habitat in Sibiria, *D. Pallas. Mus. Dom. Banks.*" The Banks Collection, now in the British Museum (Nat. Hist.) contains a single specimen labelled *scutellaris*, but this certainly did not come from Siberia, being in fact an Australian *Crocisa* with blue pubescent markings. It has since been determined as *C. lamprosoma* Bdv.

It is not very clear from Fabricius' language whether the insect described was a *Crocisa* or a *Melecta*. His diagnosis says "*scutello porrecto bidentato*," the fuller description following says "*scutellum postice productum emarginato bidentatum*"—no allusion is made to the maxillary palpi. Whatever this mysterious species really was, it seems very improbable that it should be identical with the Central European form figured by Panzer and cited by Jurine in the Erlangen List.

50

III·35. Apis (L.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 35 Apis—Apis mellifica: praeter hanc nulla."

[*i.e.* Apis L. Syst Nat. (ed. **10**) **1.** 343 no. 217, 574–9 no. 218 sp. 1–39 (1758)—**mellifera** L., etc.]

APIS L. (1758)

Type: **Apis mellifera** L. 1758 (= *mellifica* L. 1767; Lmk. 1801, Jrn. 1801, Ltr. 1802–10).

Apis L. [Fn. Suec. (ed. **1**) 298–305 sp. 988–1018 (1746) *MN.*]: Syst. Nat. (ed. **10**) **1.** 343 no. 217, 574–9 no. 218 sp. 1–39 (1758)—[Thirty-nine species, including **mellifera** L.]: Fn. Suec. (ed. **2**) [42–3], 419–26 sp. 1684–1719 (1761): Syst. Nat. (ed. **12**) **1** (**2**). 539, 953–61 no. 248 sp. 1–55 (1767) [**mellifera** L. 1758 (= *mellifica* L., 1767) etc.]; F. Syst. Ent. [27], 378–88 no. 119 sp. 1–60 (1775); Blmbch. HB. Naturges. **1.** 382–5 no. 60 sp. 1–6 (1779); F. Ent.

Syst. 2. pp. vi, 314–42 no. 158 sp. 1–123 (1793): Sppl. 273–7 (1798); Pzr. Fn. Ins. Germ. 1·16, 7·11–15 (1793): 35·23 (1796): 55·6–17, 56·4–24, 59·6–7 (1798): 63·20–2 (1799): 74·11–12, 75·19–21, 78·18–19, 80·19–21 (1800): 81·19–21, 83·18–19, 85·16–18 (1804); Ltr. Préc. Car. Ins. 138–9 (1796); Lmk. Syst. An. sans Vert. 273 no. 135 (I. 1801)—[Type: **mellifera** L. (= *mellifica* L.; Lmk.)]; Jrn. Erl. Litt-Ztg. 1. 164 no. 35 (V. 1801)—[Type: **mellifera** L. (= *mellifica* L., Jrn.)]; Ltr. HN. Fourmis etc. 438 (1802): HN. Crust-Ins. 3. 371, 386–7 (1802): 14. 66–8 no. 423 sp. 1–5 (1804–5): Nouv. Dict. HN. 1. 2–50 (1803): 24. Tbl. Meth. 184, 199 no. 467 (1804)—Type: **mellifera** L. (= *mellifica* L., Ltr.)]; F. Syst. Piez. xiv, 368–71, Ind. 1–3 no. 71 sp. 1–12 (1804); Pzr. Krit Rev. Ins. Deutsch. 2. 106–7, 254–7 (1806); Jrn. Nouv. Méth. Hym. 242–4 no. 35 Pf. 4·35, 12·35 (1807); Ltr. Gn. Crust-Ins. 4. 181–2 no. 574 (1809): Cons-Gn. Crust-Ins. 341, 439 no. 543 (1810).

51

III·36. TRACHUSA Jrn. Erl. Litt-Ztg. 1. 164.

"Gen. 36 Trachusa—Apis maculata, bicornis, fusca, rufa. Apis cornigera Ross. fronticornis. (Taurus Fabr. inedit.)—Panzer. aterrima Panzer."

TRACHUSA Jrn. (1801)

= *STELIS* Pzr. (1806).

Type: **Apis aterrima** Pzr. 61·15 (M. & D. 1915; [Pzr. 1806]).

TRACHUSA Jrn. Erl. Litt-Ztg. 1. 164 no. 36 (V. 1801)—[1. *manicata* L. (= *maculata* F., Jrn.); 2. bicornis L. (= *rufa* L., Jrn.; = *cornigera* Rossi, Jrn.; = *fronticornis* Pzr. [*Taurus* F. ined.] Jrn.); 3. *bicolor* Schrk. (= *fusca* Chr., Jrn.); 4. **aterrima** Pzr., Jrn.]; Pzr. Fn. Ins. Germ. 86·14–15, 96·18–19 (1804): Krit. Rev. Ins. Deutsch. 2. 10, 204, 209, 224, 227, 230, 239, 241, 246, 247. 265 (1806); Jrn. Nouv. Méth. Hym. 247–53 no. 36 Pf. 4·36, 12·36 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. 6. 397 (1882). *STELIS* Pzr. Krit. Rev. Ins. Deutsch. 2. 246–7 (1806)—[Type: **aterrima** Pzr. 61·15]; Ltr. Gn. Crust-Ins. 4. 163–4 no. 554 (1807): Cons-Gn. Crust-Ins. 335, 439 no. 521 (1810).

Of the seven names enumerated by Jurine in the Erlangen List (1801) as exponents of the new genus *Trachusa*, the first, *maculata*, denotes an *Anthidium* F.; the last, *aterrima*, a *Stelis* Pzr.; and all the others are at present included in *Osmia* Pzr. It will be observed that the only species now generally assigned to *Trachusa* Jrn. (viz. *serratulae* Pzr. 86·15) is not one of these seven original exponents of the genus, although it is enumerated among the species of *Trachusa* in the Nouv. Méth. Hym. (1807). This, therefore, cannot be accepted as the Type of *Trachusa* Jrn. (1801). Neither is the species figured by Jurine in

the Méthode as representing *Trachusa*, (viz. *cincta* Jrn., Pf. **12**·36—a *Dioxys* Lep.) one of the original types.

The real Type of *Trachusa* Jrn. (1801) can only be an *Anthidium* F. (1804), an *Osmia* Pzr. (1806), or a *Stelis* Pzr. (1806), and as *Trachusa* antedates all these names one of them must give place to it.

Osmia and *Anthidium* are both very long genera—Ducke in 1900 monographed 266 Palaearctic species of *Osmia*, and Friese, in 1898, 148 Palaearctic species of *Anthidium*, whereas Friese only records 22 forms of *Stelis* in 1895 (including varieties and synonyms). Clearly, therefore, by far the least inconvenience will be caused by retaining the names *Anthidium* and *Osmia* in their present senses and sinking only the somewhat less familiar *Stelis* Pzr. In justification of this method of meeting the difficulty, we may add that *Stelis* is a parasitic genus resembling in habits, and more or less in structure, *Dioxys*, and that the figure by which Jurine elected to represent his *Trachusa* in the Nouvelle Méthode (Plate **12**) is the figure of a *Dioxys*. We do not contend that Jurine had any idea of restricting the Type of *Trachusa* to the parasitic forms included in it, but by choosing one of these to supply his figure he shows at least that he regarded them as not otherwise than typical.

Stelis, then, becoming a synonym of *Trachusa*, its Type **aterrima** Pzr. (the only *Stelis* included among the original exponents of Jurine's genus) becomes the Type of *Trachusa* also.

The species *maculata* F. is a synonym of *manicata* L. (cited by Latreille in 1810 as the Type of *Anthidium* F.); *bicornis*, *rufa*, *cornigera*, and *fronticornis* are all different names for one species, viz. *bicornis* L.; and *fusca* is a synonym of *Osmia bicolor* Schrk. (*bicornis* L., F., was cited by Latreille as the Type of *Osmia* Pzr., in 1810).

[§*Taurus* F. (ined.), associated with *fronticornis* Pzr. in the Erlangen List, 1801, is homonymous with **Taurus** Storr (1780) *Mamm.*]

Diphysis Lep. (1841)

= **Trachusa* (*nec* Jrn.) Auctt.

Type: **Trachusa serratulae** Pzr. **86**·15 (= *pyrenaica* Lep.; Lep. 1841).

Diphysis Lep. HN. Ins. Hym. **2**. 307–9 sp. **1** (1841)—Type: **serratulae** Pzr. (= *pyrenaica* Lep.).

Panzer figured *Trachusa serratulae* Pzr. in 1805 (Fn. Ins. Germ. **86**·15), and this species having been included in that genus by Jurine, in 1807 (Nouv. Méth. Hym. 253) has been generally regarded as the exponent of *Trachusa* Jrn., but *serratulae* was not one of the species included in 1801 and cannot, therefore, be accepted as the Type, and not being congeneric with *aterrima* Pzr. (the Type of *Trachusa*) must be excluded from Jurine's genus. Lepeletier erected a new genus *Diphysis* in 1841 (HN. Ins. Hym. **2**. 307–9 sp. 1) for *pyrenaica* Lep., which appears to be identical with *serratulae* Pzr., and the name *Diphysis* Lep. having been adopted by Thomson, H. Müller, Pérez, etc., should take the place of **Trachusa* (*nec* Jrn.) Auctt. with Type **serratulae** Pzr.

52

III·37. **Bremus** Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 37 Bremus—Apes bombinatrices."

[*i. e.* Apis L. *Bombinatrices* L. Syst. Nat. (ed. **10**). **1**. 578–9 sp. 29–39 (1758)—**terrestris** L., etc.]

BREMUS Jrn. (1801)

= *Bombus* Ltr. (IV. 1802).

Type 1: **Apis terrestris** L. (M. & D. 1915—[Ltr. 1802–10; Crt. 1835]).

Bremus Jrn. (nn.) = *Apis* L. "*Bombinatrices*" L. Syst. Nat. (ed. **10**) **1**. 578–9 sp. 29–39 (1758)—[eleven species including **terrestris** L.]. Bremus Jrn. Erl. Litt-Ztg. **1**. 164 no. 37 (30. V. 1801); Pzr. Fn. Ins. Germ. **85**·19–21, **86**·17–18, **89**·16–17 (1801): **90**·16–17, **94**·12 (1804): Krit. Rev. Ins. Deutsch. **2**. 216, 257 (1806); Jrn. Nouv. Méth. Hym. 257–62 [no. 37] Pf. **4**·37, **12**·37 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 397 (1882). *Bombus* Ltr. HN. Fourmis etc. 437 (IV. 1802)—[Type: **terrestris** L.]: HN. Crust-Ins. **3**. 371, 385 (1802): **14**. 63–6 no. 422 sp. 1–9 (1804–5): Nouv. Dict. HN. **24**. Tbl. Méth. 184, 199 no. 466 (1804)—[Type: **terrestris** L.]; F. Syst. Piez. pp. xiv, 342–53, no. 67 sp. 1–56, Ind. 5 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 257–63 (1806): Fn. Ins. Germ. **99**·17 (1809); Ltr. Gn. Crust-Ins. **4**. 180–1 no. 573 (1809): Cons-Gn. Crust-Ins. 341, 439 no. 542 (1810)—[Type: **terrestris** L.]; Crt-Br. Ent. **12**. expl. Pl. **564** (1835)—[Type: **terrestris** L.]

Type 2: **Apis muscorum** L. (Wstwd. 1840).

Bombus (Ltr.) Wstwd. Syn. Gn. Br. Ins. 86 (1840)—[Type: **muscorum** L.].

Bremus Jrn. is a new name, proposed in 1801 for a section of *Apis*, first indicated by Linné in 1758 as *Bombinatrices hirsutissimae*—this same group was named by

Latreille *Bombus*, in 1802 (HN. Fourmis etc.), but Jurine's name antedating that of Latreille the latter sinks as a synonym. The Type of *Bombus* Ltr., designated by Latreille in 1802–10, was **terrestris** L., F., and this species should be taken also as the Type of *Bremus* Jrn. *Bremus* (= *Bombus*) included parasitic as well as industrious species; the former were removed into a separate genus *Psithyrus* by Lepeletier—these therefore are no longer to be reckoned under *Bremus*. Panzer figured eight species in 1805 under the name *Bremus* and one in 1809 under *Bombus*—these, with the exception of *aestivalis* Pzr., are all industrious.

53

III·38. MUTILLA (L.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 38 Mutilla—Mutilla."

[*i.e.* MUTILLA L. Syst. Nat. (ed. **10**) **1.** 343, 582–3 no. 219 sp. 1–8 (1758)—**occidentalis** L., **europaea** L., etc.]

MUTILLA L. (1758)

= †*MUTELLA* L. (1758).

Type 1: **Mutilla occidentalis** L. (Blmbch. 1779).

MUTILLA L. Syst. Nat. (ed. **10**) **1.** (†*MUTELLA*) 343, (‡MUTILLA) 582–3 no. 219 sp. 1–8 (1758)—[eight species including 1. **occidentalis** L., 4. *europaea* L., 7. *acarorum* L.]: Fn. Suec. (ed. **2**) [43], 427–8 sp. 1727–9 (1761): Syst. Nat. (ed. **12**) 1 (**2**). 539, 966–8 no. 250 sp. 1–10 (1767); F. Syst. Ent. [26], 396–8 no. 123 sp. 1–12 (1775); Müller Zool. Dan. Prod. An. 166 no. 1938 (1776)—[*acarorum* L.]: Blmbch. HB. Naturges. **1.** 386 no. 62 sp. 1 (1779)—[Type: **occidentalis** L.]; Ltr. Jr. HN. **2.** 98–101 (1792); F. Ent. Syst. **2.** pp. v, 366–72 no. 163 sp. 1–28 (1793): Sppl. 281–2 (1798); Ltr. Préc. Car. Ins. 118–20 no. 20 (1796); F. Syst. Piez. pp. xi, 428–39 no. 83 sp. 1–51, Ind. 19–20 (1804).

Type 2: **Mutilla europaea** L. (Lmk. 1801, Ltr. 1810, Crt., Wstwd.).

MUTILLA L. Syst. Nat. (ed. **10**) **1.** 343, 582–3 no. 219 sp. 1–8 (1758)—[**europaea** L., etc.]; Pzr. Fn. Ins. Germ. **46**·18–20 (1797): **55**·24 (1798): **62**·19–20 (1799): **76**·20, **80**·22 (1800): **83**·20 (1801): **97**·20, **106**·21 (1809); Lmk. Syst. An. sans Vert. 268 no. 125 (I. 1801)—[Type: **europaea** L., F.]; Jrn. Erl. Litt-Ztg. **1.** 164 no. 38 (V. 1801); Ltr. HN. Crust-Ins. **3.** 351 (1802): **13.** 262–6 no. 370 sp. 1–6 (1804–5): Nouv. Dict. HN. **15.** 297–8 (1803): **24.** Tbl. Méth. 179 no. 414 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 211–13 (1806); Jrn. Nouv. Méth. Hym. 263–8 no. 38 Pf. **5**·38, **12**·38, **13**·7 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 392 (1882); Ltr. Gn. Crust-Ins. **4.** 120–1 no. 524 (1809): Cons-Gen. Crust-Ins. 314, 437 no. 450 (1810)—[Type: **europaea** L.]; Crt. Br. Ent. **2.** expl. Pl. **77** (1825)—[Type: **europaea** L.]; Wstwd. Syn. Gn. Br. Ins. 83 (1840)—[Type: **europaea** L.].

The genus *Mutilla*, which originated with Linné in 1758, contained eight species including **occidentalis** L., **europaea** L., and *acarorum* L.

In 1779 Blumenbach cited **occidentalis** L. as the typical exponent of *Mutilla*, while Lamarck (1801) designated **europaea** L. as the Type, and was followed by Latreille (1802–10), Curtis (1825) and Westwood (1840).

It should be noted that Müller [Zool. Dansk. Prod. An. 166 no. 1938 (1776)], in a merely local list of a limited fauna, mentions one species only as a *Mutilla*, viz. *acarorum* L., but this, even if it were the citation of a Type, could not be maintained, for *acarorum* (a *Pezomachus*) was only doubtfully included in *Mutilla* by Linné: ("*Haec differt a reliquis quod glabra nec tomentosa sit, & videtur potius* Sphex aptera *esse*").

54

III·39. FORMICA (L.) Jrn. Erl. Litt-Ztg. **1.** 164.

"Gen. 39 Formica—Formica."

[*i.e.* FORMICA L. Syst. Nat. (ed. **10**) **1.** 343, 579–82 no. 218 sp. 1–17 (1758)—**rufa** L., *fusca* L. etc.]

FORMICA L. (1758)

Type 1: **Formica rufa** L. (Lmk. 1801; Crt. 1839).

FORMICA L. [Fn. Suec. (ed. **1**) 305–6 sp. 1019–23 (1746) *MN.*]: Syst. Nat. (ed. **10**) **1.** 343, 579–82 no. 218 sp. 1–17 (1758)—[seventeen species including 2 **rufa** L., 3 *fusca* L.]: Fn. Suec. (ed. **2**) [43], 426–7 sp. 1720–6 (1761): Syst. Nat. (ed. **12**) **1** (**2**). 539 no. 249, 966–8 no. 250 sp. 1–10 (1767); F. Syst. Ent. [26], 391–6 no. 122 sp. 1–27 (1775); Blmbch. HB. Naturges. **1.** 385–6 no. 61 sp. 1–5 (1779)—[**rufa** L., etc.]: F. Ent. Syst. **2.** pp. v, 349–65 no. 161 sp. 1–60 (1793): Sppl. 279–81 (1798); Ltr. Préc. Car. Ins. 120–1 no. 22 (1796): Pzr. Fn. Ins. Germ. **54**·1–2 (1798): Lmk. Syst. An. sans Vert. 268 no. 124 (I. 1801)—[Type: **rufa** L.]; Jrn. Erl. Litt-Ztg. **1.** 164 no. 39 (V. 1801); Ltr. HN. Fourmis etc. 88–296 (IV. 1802): HN. Crust-Ins. **3.** 353–7 (1802): **13.** 254–6 no. 362 sp. 1–8 (1804–5): Nouv. Dict. HN. **9.** 20–37 (1803): **24.** Tbl. Méth. 178 no. 406 (1804): F. Syst. Piez. pp. xi, 395–414 no. 77 sp. 1–75, Ind. 12–14 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 11, 214–6 (1806); Jrn. Nouv. Méth. Hym. 269–73 no. 39 Pf. **5**·39, **12**·39 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 391 (1882): Ltr. Gn. Crust-Ins. **4.** 125–6 no. 528 (1809): Cons-Gen. Crust-Ins. 311, 437 no. 441 (1810)—[*herculanea* L., **rufa** L.]; Crt. Br. Ent. **16.** expl. Pl. **752** (1839)—[Type: **rufa** L.].

Type 2: **Formica fusca** L. (Wstwd. 1840).

FORMICA (L.) Wstwd. Syn. Gn. Br. Ins. 83 (1840)—[Type: **fusca** L.].

55

III·40. **Cynips** (L.) Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 40 Cynips—Cynips. Ophion cultellator."

[*i.e.* Cynips L. Syst. Nat. (ed. **10**) **1**. 343, 553–5 no. 213 sp. 1–14 (1758)—**quercus-folii** L., etc.]

CYNIPS L. (1758)

Type 1: **Cynips quercus-folii** L. (Lmk. 1801; Wstwd. 1840).

Cynips L. Syst. Nat. (ed. **10**) **1**. 343 no. 212, 553–5 no. 213 sp. 1–14 (1758)—[fourteen species including 1. *rosae* L., 5. **quercus-folii** L., 13. *psenes* L.]: Fn. Suec. (ed. 2) [40–1], 385–88 sp. 1518–32 (1761): Syst. Nat. (ed. **12**) **1** (2). 539, 917–20 no. 241 sp. 1–19 (1767): F. Syst. Ent. [25], 315–7 no. 104 sp. 1–15 (1775); Blmbch. HB. Naturges. **1**. 377 no. 53 sp. 1–3 (1779)—[**quercus-folii** L., etc.]; F. Ent. Syst. **2**. pp. iv, 100–4 no. 137 sp. 1–22 (1793): Sppl. 213–4 (1798); Ltr. Préc. Car. Ins. 108–9 no. 6 (1796); Pzr. Fn. Ins. Germ. **51**·1 (1798): **74**·9, **79**·7 (1800): **87**·16, **88**·10–13, **95**·12 (1804); Lmk. Syst. An. sans Vert. 266 no. 121 (I. 1801)—[Type: **quercus-folii** L., F.]; F. Syst. Piez. pp. vii, 143–8 no. 20 sp. 1–23, Ind. 10-11 (1804); Pzr. Krit. Rev. Ins. Deutsch. 92–3 (1806); Jrn. Nouv. Méth. Hym. 284–6 no. 40 Pf. 5·40, 12·40 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 391 (1882); Wstwd. Syn. Gn. Br. Ins. 56 (1840)—[Type: **quercus-folii** L.].

Type 2: **Ichneumon bedeguaris** L. (Ltr. 1810).

Cynips (L.) Ltr. HN. Crust-Ins. **3**. 312–4 (1802): **13**. 221–5 no. 349 (1804-5): Ltr. Nouv. Dict. HN. **5**. 480-5 (1803): **24**. Tbl. Méth. 175-6 no. 394 (1804): Gn. Crust-Ins. **4**. 28 no. 454 (1809): Cons-Gen. Crust-Ins. 303–4, 436 no. 415 (1810)—[Type: **bedeguaris** L., F.]

Type 3: **Cynips quercus-radicis** F. (Crt. 1838).

Cynips* (L.) Crt. Br. Ent. **15. expl. Pl. **688** (1838)—[**quercus-radicis** F. is cited as Type; but this was not one of the species included in the genus by Linné.]

[*nec* **Cynips* Jrn. Erl. Litt-Ztg. **1**. 164 no. 40 (I. 1801)—**leucospoides** Hochenw. 1785 (= *cultellator* F., 1793, Jrn.). (**Ibalia** Ltr. 1802 (= *Sagaris* Pzr. 1806)].

Jurine, Erlangen List (1801) does not affect the genus *Cynips* L., for "*cultellator*" was not included in the genus by Linné.

56

III·41. **Chelonus** Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 41 Chelonus—Ichneumon oculator."

CHELONUS Jrn. (1801)

Type 1: **Ichneumon oculator** F. (Jrn. 1801; Crt. 1837).

Chelonus Jrn. Erl. Litt-Ztg. **1**. 164 no. 41 (30. V. 1801)—

[Type: **oculator** F.]; Pzr. Fn. Ins. Germ. **88**·14 (1804)—[**oculator** F.; *dentatus* Pzr.]: Krit. Rev. Ins. Deutsch. **2**. 10, 99–100 (1806); Jrn. Nouv. Méth. Hym. 289–91 no. 41 Pf. **5**·41, **12**·41 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 392 (1882); Crt. Br. Ent. **14**. expl. Pl. **672** (1837)—[Type: **oculator** F.]; Vrk. Bull. US. Nat. Mus. **83**. 31, 171, 177 (1914)—[Type: **oculator** F.].

Type 2: **Cynips inanita** L. (Wstwd. 1840).

**Chelonus* (Jrn.) Wstwd. Syn. Gn. Br. Ins. 63 (1840)—[Type: *inanita* L.—this species was not included in the genus by Jurine].

Viereck accredits this genus to Panzer (Krit. Rev. 1806), and the designation of its Type to Curtis, but it now appears that *Chelonus* was first published by Jurine as a "monobasic" genus with Type **oculator** F. in the Erlangen List (1801).

57

III·42. Chrysis (L.) Jrn. Erl. Litt-Ztg. **1**. 164.

"Gen. 42 Chrysis—Chrysis. Ichneumon auratus, semiauratus."

[*i. e.* Chrysis L. Fn. Suec. (ed. **2**) [42], 414–5 sp. 1665–9 (1761)—1. **ignita** L., 2. *aurata* L., etc.]

CHRYSIS L. (1761)

Type: **Sphex ignita** L. (Blmbch. 1779; Lmk. 1801; Ltr. 1802–10, etc.).

Chrysis L. Fn. Suec. (ed. **2**) [42], 414–5 sp. 1665–9 (1761)—[five species including **ignita** L.]: Syst. Nat. (ed. **12**) **1** (**2**). 539, 947–8 no. 246 sp. 1–7 (1767); F. Syst. Ent. [25], 357–9 no. 112 sp. 1–15 (1775); Blmbch. HB. Naturges. **1**. 380 no. 58 sp. 1 (1779)—[Type: **ignita** L.]; F. Ent. Syst. **2**. pp. v, 238–43 no. 147 sp. 1–22 (1793): Sppl. 257–8 (1798); Pzr. Fn. Ins. Germ. **5**·22 (1793): **51**·5–12 (1798): **77**·15–16, **79**·15–16 (1800): **107**·11–12 (1809); Ltr. Préc. Car. Ins. 126–7 no. 28 (1796); Lmk. Syst. An. sans Vert. 270 no. 129 (I. 1801)—[Type: **ignita** L., F.]; Ltr. HN. Crust-Ins. **3**. 317 (1802)—[Type: **ignita** L.]: **13**. 237–9 no. 360 sp. 1–7 (1804–5): Nouv. Dict. HN. **5**. 441–2 (1803): **24** Tbl. Méth. 177 no. 405 (1804); F. Syst. Piez. pp. x, 170–6 no. 26 sp. 1–33, Ind. 7–8 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 100–3 (1806); Jrn. Nouv. Méth. Hym. 292–7 no. 42 Pf. **5**·42, **12**·42 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 397 (1882); Ltr. Gn. Crust-Ins. **4**. 50 no. 479 (1809): Cons-Gen. Crust-Ins. 310, 437 no. 439 (1810)—[Type: **ignita** L., F.]; Crt. Br. Ent. **1**. expl. Pl. **8** (1824)—[Type: **ignita** L.]; Wstwd. Syn. Gn. Br. Ins. 79 (1840).

[*nec* **Chrysis* Jrn. Erl. Litt-Ztg. **1**. 164 no. 42 (V. 1801)—*auratus* L. (Omalus Pzr.); *semiauratus* L. (Cleptes Ltr.)].

Neither *aurata* L., nor *semiaurata* L., (named as representations of *Chrysis* L. by Jurine in the Erlangen List) belong to that genus as now defined; the first is an *Omalus*

Pzr. (= *Elampus* Spin.) and the second a *Cleptes* Ltr. The Type of *Chrysis* L. is **ignita** L. as designated by Blumenbach (1779), Lamarck (1801), Latreille (1802–10), Curtis (1824) and Westwood (1840).

58

III·43. **Omalus** Jrn. Erl. Litt-Ztg. **1.** 164.
"Gen. 43 Omalus."—[No types—a mere logonym.]

OMALUS Pzr. (1804)

= *Omalus* Jrn. (V. 1801) *LN.*; = *Elampus* Spin. (1806); †*Ellampus* Agassiz, Mocs.

Type: **Omalus aeneus** Pzr. (Pzr. 1804).

Omalus Pzr. [Jrn. Erl. Litt-Ztg. **1.** 164 no. 43 (V. 1801) *LN.*]; Pzr. Fn. Ins. Germ. **85**·13 (1804)—[Type: **aeneus** Pzr.]: **97**·17 (1806)—[**aeneus** Pzr. ♂ **85**·13 (= *nitidus* Pzr. ♀ **97**·17)]: Krit. Rev. Ins. Deutsch. **2.** 95, 103 (1806). *Chrysis* L. (4. *Elampus* Spin.) Spin. Ins. Lig. **1.** 10–11 (1806)—[*aurata* L., **aenea** Pzr., etc.]. *Ellampus* Mocs. Mon. Chrysid. 63–113 no. 5. sp. 31–98 (1889). *Ellampus* Spin. (3. *Ellampus* Mocs.) Mocs. Mon. Chrysid. 82–107 sp. 59–92 (1889)—[71 *aurata* L., 76 **aenea** Pzr.—The latter should be taken as Type].

[*nec* **Omalus* Jrn. Nouv. Méth. Hym. 300–1 no. 43 Pf. **5**·43, **13**·43 (1807)—*cenopterus* Pzr. (**Psilus** Jrn.) *vide* no. 63. p. 436].

Omalus in the Erlangen List (1801) is a mere logonym, but Panzer, in 1804 (Fn. Ins. Germ. **85**·13) gave it status in nomenclature by associating it with a definite species **Omalus aeneus** Pzr. (a Chrysid), and in 1806 (Fn. Ins. Germ. **97**·27) added *nitidus* Pzr., which is identified as the ♀ of *aeneus* Pzr. in Krit. Rev.

In Nouv. Méth. Hym., Jurine characterised his genus, which was evidently that intended by the mere word "*Omalus*" of the Erlangen List, figuring a species under the name *fuscicornis* Jrn., and mentioning other species, two of which had been figured and described by Panzer as *hemipterus* F. (**77**·14) and *cenopterus* Pzr. (**81**·14). *Omalus* Pzr. (*nec* Jrn.) has been sunk by all recent authors (Mocsary, R. du Buysson, etc.) as a synonym of *Elampus* (or *Ellampus*) Spinola, but it would seem that *Omalus* Pzr., though based on an error of identification was, notwithstanding, potentially a valid name, and, being older by a year than *Elampus*, obtained priority.

59

III·44. CERAPHRON Jrn. Erl. Litt-Ztg. **1.** 165.

"Gen. 44 Ceraphron."—[No types—a mere logonym.]

CERAPHRON Pzr. (1805)

= *CERAPHRON* Jrn. (V. 1801) *LN*.

Type: **Ceraphron formicarius** Pzr. (Pzr. 1805).

CERAPHRON Pzr. [Jrn. Erl. Litt-Ztg. **1.** 165 no. 44 (V. 1801) *LN*]; Pzr. Fn. Ins. Germ. **97**·16 (1805)—[Type: **formicarius** Pzr.]: Krit. Rev. Ins. Deutsch. **2.** 135 (1806).

Edward Saunders (Index to Panzer's Fauna Insectorum Germaniae, p. [2]) gives the date of Pzr. "XCVI" as 1805, and "XCVII" as 1809, but since *formicarius* Pzr. **97**·16 is quoted by Panzer in Krit. Rev. (1806) this plate should be assumed to have been published in 1805 unless actual evidence to the contrary can be produced. [Heft **96** was published in 1804, before October—*teste* C. D. Sherborn.]*

[*nec* **CERAPHRON* Jrn. [Erl. Litt-Ztg. **1.** 165 no. 44 (V. 1801) *LN*]: Nouv. Méth. Hym. 303–4 no. 44 Pf. **5**·44, **13**·44, **14**·9 (1807)—[1. *frontale* Ltr. (= *cornutus* Jrn.); 2. **sulcatus** Jrn.]; F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 392 (1882)—[*frontale* Ltr. ♂ (= *cornutus* Jrn.]; Spinola Ins. Lig. **2** (3). 168 no. 12 sp. 1 (1806)—[Type: **sulcatus** Jrn.]; Ltr. Gn. Crust-Ins. **4.** 35–6 (1809)—[Type: **sulcatus** Jrn.]: Cons-Gen. Crust-Ins. 306, 436 no. 427 (1810); Crt. Br. Ent. **6.** expl. Pl. **249** (1829)—Type: **sulcatus** Jrn.]; Wstwd. Syn. Gn. Br. Ins. **77** (1840)—[Type: **sulcatus** Jrn. (MEGASPILUS. Wstwd.)].

Ceraphron Jrn. of the Erlangen List (1801) was a mere word without description or exponents. In 1805, Panzer associated *formicarius* Pzr. with *Ceraphron* which thus obtained a status in nomenclature, and when Jurine in 1807 (Nouv. Méth. Hym.) published *his* description of *Ceraphron* with exponents, *Ceraphron* Pzr. had already obtained a year's priority in association with a different species.

60

III·45. LEUCOSPIS (F.) Jrn. Erl. Litt-Ztg. **1.** 165.

"Gen. 45 Leucopsis—Leucopsis."

[*i.e.* LEUCOSPIS F. Syst. Ent. [25], 361 no. 114 sp. 1 (1775)—Type: **dorsigera** F.]

LEUCOSPIS F. (1775)

= †*LEUCOPSIS* F., Lmk., Jrn.

Type: **Leucospis dorsigera** F. (F. 1775).

LEUCOSPIS F. Syst. Ent. [25], 361 no. 114 sp. 1 (1775)—[Type: **dorsigera** F.]: Ent. Syst. **2.** pp. v, 245–7 no. 149 sp. 1–3 (1793):

* Mr. Sherborn has very kindly allowed us to collate his notes with our own.

Sppl. 259 (1798): Pzr. Fn. Ins. Germ. **15**·17 (1794): **58**·15 (1798): **84**·17–18 (1801); Ltr. Préc. Car. Ins. 109–10 no. 7 (1796). *Leucopsis* Lmk. Syst. An. sans Vert. 267 no. 122 (I. 1801): Jrn. Erl. Litt-Ztg. **1**. 165 no. 45 (V. 1801). Leucospis Ltr. HN. Crust-Ins. **3**. 311 (1802): **13**. 218–9 no. 347 (1804–5): Nouv. Dict. HN. **13**. 111–12 (1803): **24**. Tbl. Méth. 175 no. 392 (1804). *Leucopsis* F. Syst. Piez. p. x no. 25 (1804). Leucospis F. Syst. Piez. 168–70 no. 25 sp. 1–6, Ind. 18 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2**. 100 (1806); Jrn. Nouv. Méth. Hym. 305–7 no. 45, [*Leucopsis*] Pf. **5**·45, **13**·45 (1806); F-G. K. & K. MT. Schweiz. Ent. Ges. **6**. 392 (1882); Ltr. Cons-Gen. Crust-Ins. 303, 436 no. 412 (1810).

"*Leucopsis*" of the Erlangen List is probably a mere error, but this spelling also occurs on the Plates of the Nouv. Méth. (not in the text), in Lamarck's Syst. An. sans Vert. (1801) and on p. x of Fabricius' Syst. Piez. (1804), but in Ent. Syst. **2** (the work cited by Jurine) the spelling is *Leucospis*.

61

III·46. Codrus Jrn. Erl. Litt-Ztg. **1**. 165.

"Gen. 46 Codrus."—[No types—a mere logonym.]

CODRUS Pzr. (1801)

= *Codrus* Jrn. (V. 1801) *LN*.

Type: **Codrus niger** Pzr. (Pzr. 1801).

Codrus Pzr. [Jrn. Erl. Litt-Ztg. **1**. 165 no. 46 (V. 1801) *LN*.]; Pzr. Fn. Ins. Germ. **85**·9 (VII. 1801)—[Type: **niger** Pzr.]; Jrn. Nouv. Méth. Hym. 308–9 no. 46 Pf. **5**·46, **13**·46 (1806)—[**niger** Pzr. and two other species].

Codrus was first published in the Erlangen List (30. V. 1801), but being without description or associated species must be attributed to Panzer, who gave as an exponent *niger* Pzr., later in the same year (VII. 1801). Jurine described the genus in 1807 including two other species with niger Pzr.

62

III·47. Chalcis (F.) Jrn. Erl. Litt-Ztg. **1**. 165.

"Gen. 47 Chalcis—Chalcis. Cynips armata Panzer. pluresque Ichneum. minuti."

[*i.e.* Chalcis F. Mant. Ins. **1**. pp. xv, 272–3 no. 116 sp. 1–7 (1787)—**sispes** L., etc.]

CHALCIS F. (1787)

= *Smiera* (Spin.) Crt.

Type: **Sphex sispes** L., F. (Lmk. 1801, Ltr. 1802).

Chalcis F. Mant. Ins. **1.** pp. xv no. 115, 272–3 no. 116 sp. 1–7 [1787]—[1. **sispes** L., and six other species]: Ent. Syst. **2.** pp. v, 194–8 no. 142 sp. 1–11 (1793): Sppl. 242–3 (1798); Pzr. Fn. Ins. Germ. **32**·6 (1796): **76**·14, **77**·11, **78**·15–16, **84**·16 (1801): **88**·15 (1804); Lmk. Syst. An. sans Vert. 266 no. 120 (I. 1801)—[Type: **sispes** L.]; Jrn. Erl. Litt-Ztg. **1.** 165 no. 47 (V. 1801); Ltr. HN. Crust-Ins. **3.** 311–12 (1802)—[Type: **sispes** L., F.]: **13.** 219–21 no. 348 sp. 1–6 (1804–5): Nouv. Dict. HN. **4.** 572–3 (1803): **24.** Tbl. Méth. 175 no. 393 (1804); F. Syst. Piez. pp. x, 159–67 no. 24 sp. 1–33, Ind. 7 (1804); Pzr. Krit. Rev. Ins. Deutsch. **2.** 92, 93, 95, 97–9 (1806); Jrn. Nouv. Méth. Hym. 312–16 no. 47 Pf. **5**·47, **13**·47 (1807); F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 392 (1882); Ltr. Gn. Crust-Ins. **4.** 25–7 no. 452 (1809): Cons-Gen. Crust-Ins. 303, 436 no. 413 (1810). *Smiera* (Spin.) Crt. Br. Ent. **10.** expl. Pl. **472** (1833). Chalcis Wstwd. Syn Gn. Br. Ins. 65 (1840).

63

III·48. **Psilus** Jrn. Erl. Litt-Ztg. **1.** 165.

"Gen. 48 Psilus—Tiphia cenoptera Panzer."

PSILUS Jrn. (1801)

= **Omalus* Jrn. (1801 *LN.*; 1807); = **Bethylus* [*nec* Ltr.] Wstwd.

Type: **Tiphia cenoptera** Pzr. (Jrn. 1801).

Psilus Jrn. Erl. Litt-Ztg. **1.** 165 no. 48 (30. V. 1801)—[Type: **cenoptera** Pzr.]. **Omalus* Jrn. [Erl. Litt-Ztg. **1.** 164 no. 43 (30. V. 1801) *LN.*]: Nouv. Méth. Hym. 300–1 no. 43 Pf. **5**·43, **13**·43 (1807)—[**cenoptera** Pzr., and two other species]; F-G. K. & K. MT. Schweiz. Ent. Ges. **6.** 392 (1882). **Bethylus* (*nec* Ltr.) Wstwd. Syn. Gn. Br. Ins. 76 (1840)—[Type: **cenoptera** Pzr.].

[*nec* **Psilus* Pzr. Fn. Ins. Germ. **83**·11 (1801)—[*cornutus* Pzr.]: Krit. Rev. Ins. Deutsch. **2.** 93 (1806)—[*cornutus* Pzr.]; Jrn. Nouv. Méth. Hym. 317–19 no. 48 Pf. **5**·48, **13**·48 (1807)—[*cornutus* Pzr., and three other species]—*cornutus* Pzr. (**Sparasion** Ltr.)].

Psilus of the Erlangen List (1801) had as Type *Tiphia cenoptera* Pzr., which was referred to the genus *Ceraphron* (Jrn.) Pzr., by Panzer in 1806, while the *Psilus* of Panzer (1801) included only a single species *Psilus cornutus* Pzr. (†*cornatus* Pzr.) now placed in the genus *Sparasion* Ltr. Westwood, in 1840, cited *Tiphia cenoptera* Pzr. as the Type of *Bethylus* Ltr., but *Bethylus* Ltr. (1802) was a monotypical genus founded on *Tiphia hemiptera* F.

XIII. *New Species of* Lepidoptera-Heterocera *from S.E. Brazil.* By E. Dukinfield Jones, F.E.S., F.Z.S.

Part II.

[Read March 18th, 1914.]

Fam. NOCTUIDAE.

Subfam. Hadeninae.

Eriopyga lycophotia, sp. n.

♀. Palpi light brown with some darker scales at sides; pectus and legs dark brown; antennae brown; head and thorax brown mixed with ochreous; abdomen light brown, darker beneath. Fore-wings light brown suffused with dark brown; antemedial line dark brown, straight from costa to median nervure, excurved below median to inner margin, preceded by dark shade; postmedial line oblique from costa to discal fold, then bent inwards to near middle of inner margin, forming a rather rounded right angle on the fold; an indistinct broken subterminal line; orbicular and reniform small, indistinctly defined by dark brown; cilia light brown. Hind-wings ochreous, costa and margins broadly suffused with brown. Underside of fore-wings; the cell clothed with long silky hairs lying evenly outwards.

Expanse 36 mm.

Hab. Castro, Paraná.

Eriopyga suffusa, sp. n.

♀. Palpi light and dark brown mixed; frons, head, tegulae, thorax and patagia pinkish brown, the scales tipped with ochreous white; abdomen brown, dorsally suffused with fuscous. Fore-wings pinkish brown; a diffused dark spot at base of cell; antemedial line indicated on costa, median nervure and vein 1; a very faint double reddish brown bar below orbicular from cell to vein 1; a diffused reddish brown medial shade, excurved in cell; a diffused reddish brown postmedial line excurved from costa to vein 4, then slightly incurved to inner margin, followed by lighter shade and indistinct fuscous dots on veins; a diffused lighter subterminal line, almost straight; the terminal area suffused with reddish brown;

cilia reddish brown; costa and inner margin light brown; orbicular and reniform rather large, reddish brown, defined by fuscous followed by whitish. Hind-wings white, the veins light brown; costal and apical areas broadly and termen narrowly suffused with light brown and irrorated with dark brown.

Expanse 32 mm.

Hab. Castro, Paraná.

Eriopyga ignita, sp. n.

♂. Palpi inwardly light brown, outwardly purple brown; frons, head, tegulae, antennae and thorax deep purple brown; abdomen brown, dorsally suffused with fuscous, the anal tuft lighter, beneath purplish brown. Fore-wings fiery red; an indistinct dark sub-basal line excurved below costa, angled inwards on base of cell and outwards below cell, followed by a yellow spot on costa and by large yellow space irrorated with red on submedian area, extending nearly to medial dark shade; antemedial line dark, interrupted on costal area, excurved in cell, angled inwards on median nervure, excurved below across yellow space, angled inwards on vein 1 and strongly excurved to inner margin; a yellow spot before antemedial on costa; a diffused dark purple brown medial shade merging into dark area of cell and beyond cell to postmedial line; postmedial line strongly dentate, the outward points ending in dark dots on the veins, followed by yellow spot on costa; an almost straight very slightly excurved subterminal line followed by lighter shade of fiery red, the veins across it dark purple brown; a terminal series of dark lunular spots between the veins; cilia dark brown; four yellow streaks on costa before apex; orbicular yellow with red scales in centre; reniform yellow, silvery white at lower end, crossed by red discocellular, upper end not so distinctly white and crossed by red bar. Hind-wings dark fuscous brown.

Expanse 24 mm.

Hab. Alto da Serra, Santos.

Eriopyga paulista, sp. n.

♂. Palpi inwardly rufous, outwardly brown; legs brown, the hairs rufous; frons, head, tegulae and thorax rufous; abdomen brown tinged with rufous near extremity; anal tuft ochreous tinged with rufous. Fore-wings purplish brown: subbasal line purplish grey followed by indistinct dark shade, strongly excurved at base of cell; antemedial line purplish grey slightly defined on both sides by dark lines, nearly straight from costa to vein 1 where it is bent

inwards to inner margin; postmedial line oblique from costa to vein 8, then slightly and evenly excurved to inner margin; a wavy subterminal line slightly angled inwards on vein 8, excurved from 8 to 5, slightly angled inwards on vein 5, excurved to 2, then bent outwards to inner margin; a wavy terminal line with dark spots between the veins; terminal area light reddish brown; cilia rufous; orbicular and reniform very large, well defined by ochreous, the former oblique, oval, extending well below the cell, a light shade in centre, rufous towards the edges and a dark shade within the ochreous ring; reniform excavated on outer side, extending well below end of cell and including discocellulars; a light shade on discocellulars. Hind-wings dark brown; cilia rufous.

Expanse 48 mm.

Hab. Alto da Serra, Santos.

Subfam. Acronyctinae.

Speocropia mamestroides, sp. n.

♀. Rufous brown; the scales on head and body tipped with grey; some scattered black scales on tegulae; metathoracic crest purplish brown; abdomen light reddish brown. Fore-wings rufous irrorated with purple-brown, the veins dark purple-brown, the lines rather obscure; an indistinct dark subbasal line; antemedial line double, more clearly defined on submedian fold, where it is strongly angled outwards, preceded by dark suffusion on inner margin; a narrow diffused medial shade; postmedial line wavy, diffused, dentate, oblique from costa to vein 7, where it is strongly excurved; subterminal line dentate, followed by lighter shade; terminal area dark; termen crenulate, dark purple-brown; cilia purple-brown with whitish line at base, pale rufous at tornus; orbicular oval defined by dark purple-brown; reniform rather obscure, some ochreous scales beyond it. Hind-wings ochreous white suffused with rufous brown; a large diffused discocellular spot; a narrow diffused wavy postmedial and broad diffused terminal band; termen dark; cilia ochreous white.

Expanse 44 mm.

Hab. Castro, Paraná.

Iheringia, gen. nov.

Proboscis fully developed; palpi upturned, the 2nd joint reaching to middle of frons and moderately scaled, the 3rd long, porrect; frons smooth; eyes large, round; antennae of ♂ ciliated; thorax

clothed with scales, without crests; tibiae clothed with scales; abdomen without crests. Fore-wings with the apex slightly acute; termen very slightly excavated on discal fold, then excurved to tornus; costa slightly excurved at base, then straight to close to apex; vein 3 from well before angle of cell; 5 well above angle; 6 from upper angle; 7 from end of areole; 8 and 9 stalked from end of areole; 10 from areole; 11 from cell. Hind-wings with veins 3 and 4 from angle of cell; 6 and 7 from upper angle; 8 anastomosing with cell at base only.

Type I. *santista*, sp. n.

I have named this genus after Dr. von Ihering, Curator of the National Museum at São Paulo, through whose kindness and courtesy I was enabled to make a fine collection at the Biological Station at Alto da Serra, Santos.

Iheringia santista, sp. n.

♂. Palpi light brown mixed with white, a few black scales at sides, ends of joints white; tibiae light brown mixed with white; frons ochreous white with scattered black scales; antennae brown, grey on upper side at base; tegulae pale olive green ochreous and white, a black outward spot at base; thorax ochreous white; abdomen ochreous brown above, lighter beneath with three narrow black ventral lines and double ill-defined sublateral lines. Fore-wings ochreous white suffused with pale reddish brown and pale olive green; costa pale olive green with some white streaks near apex and a large subbasal black spot crossed by oblique brown line and followed by whitish; antemedial line black, strongly waved, oblique at costa, strongly angled outwards in cell, on vein 2 and on submedian fold, then incurved to inner margin near base; post-medial line black, dentate, the outward points on the veins, preceded and followed by white on the veins; a diffused dark medial shade, oblique at costa, strongly excurved at end of cell and incurved to middle of inner margin; an indistinct wavy subterminal line preceded by black patches above veins 3 and 5, the space beyond white irrorated with pale olive green; termen black; cilia pale reddish brown with darker centre line; orbicular and reniform pale olive green defined by dull orange, the latter confluent with a similar spot below the cell; a discocellular pale olive green mark irrorated with orange and slightly defined by black; some orange irroration beyond the cell; a reddish brown subcostal mark on inner area and a diffused short fascia in lower half of cell, two longer ones below the cell separated by double fine lines which run from subbasal to antemedial line. Hind-wings pale reddish brown

outwardly suffused with dark brown; cilia light reddish brown with whitish tips.

Expanse 35 mm.

Hab. Alto da Serra, Santos.

Chytonix variegata, sp. n.

♂. Palpi light brown with some fuscous at sides; pectus and coxae dark reddish brown; legs fuscous and light brown; mid-tibiae light brown with broad fuscous band at distal end; tarsi ringed with light brown; frons ochreous tinged with reddish brown, a few scattered darker scales; back of head dark purplish brown; tegulae olive green with broad fuscous band; patagia pale reddish brown mixed with darker scales, base olive green; thorax pale reddish brown, metathoracic crest tipped with purplish brown; abdomen pale reddish brown suffused with fuscous. Fore-wings: three obscure dark basal spots above, in and below cell; an indistinct wavy dark geminate subbasal line well defined on costa; a wavy dark geminate antemedial line strongly excurved, preceded by dark shades on costa and inner margin; a medial dark shade; a fine black postmedial line, clearly defined and preceded by bluish grey, from vein 8 to vein 2 and followed by incurved lunular dark olive mark inwardly rufous and outwardly light olive green; a terminal series of lunular spots between the veins; a large dark purple brown spot on vein 3 enclosing clear white spot; a dark apical shade confluent with the olivaceous lunular mark; costa olive green from base to postmedial line; short fuscous streaks on extreme costa; diffused olive green fasciae above veins 1 and 2, the former from before antemedial to postmedial, the latter from antemedial to the dark spot on vein 3; orbicular and reniform small, tawny; lower half of cell on medial area buff, upper half suffused with bluish grey; a dark discocellular bar outwardly tawny; cilia reddish brown with dark central line, fuscous at apex and between veins 2 and 4. Hind-wings brown broadly suffused with darker brown on terminal area.

Expanse 24 mm.

Hab. Alto da Serra, Santos.

Selambina cuprea, sp. n.

♀. Palpi, head, legs, antennae and body cupreous brown. Fore-wings cupreous brown; antemedial line dark, sinuous, excurved above cell, incurved in cell, excurved below cell and slightly incurved to inner margin; postmedial line dark, broad and diffused, excurved

from costa to vein 5, incurved from 5 to near middle of inner margin, followed by lighter shade to subterminal line; subterminal line dentate, the outward points ending in black dots on the veins, followed by whitish; termen dark, interrupted at veins by yellowish brown spots; orbicular represented by black point surrounded by whitish; a pure white sickle-shaped mark on discocellulars; some white irroration below costa near apex and four yellowish points on costa; cilia dark cupreous brown. Hind-wings ochreous outwardly suffused with cupreous brown. Underside of fore-wings a black lunular discocellular spot and dentate subterminal line followed by dark triangular spot on costa; hind-wings black discocellular spot and indistinct postmedial and subterminal lines.

Expanse 31 mm.

Hab. Alto da Serra, Santos.

Gonodes pallida, sp. n.

♂. Palpi light brown, some darker scales at sides; pectus ochreous white; legs brown; fore coxae whitish with scattered dark scales; frons ochreous mixed with brown; head, tegulae, patagia and thorax ochreous white with a few scattered dark brown and black scales; antennae reddish brown; abdomen ochreous slightly suffused with light brown. Fore-wings ochreous white slightly irrorated with fuscous; a faint indication of antemedial line excurved below cell; an oblique light line from costa above middle of cell through lower angle of cell and below vein 4 to termen; a dark fuscous triangular patch in upper angle of cell, continued to costa, the whole patch being surrounded by whitish excepting on costa; a postmedial line strongly excurved beyond upper angle of cell and faintly indicated on lower half of wing; subterminal line indistinct; termen brown; cilia ochreous white; a light brown space beyond postmedial to termen and to costa just before apex; costal area between dark fuscous patch and postmedial line grey; the light portions of wing with slight lilacine reflexion. Hind-wings white suffused with brown at termen and on discal fold; indications of postmedial band near inner margin; a diffused discocellular spot; costal area iridescent.

Expanse 26 mm.

Hab. Castro, Paraná.

Gonodes lilla, sp. n.

♂. Palpi ochreous, some dark brown scales at sides; pectus ochreous white; coxae ochreous white with brown bar; fore

femora brown tinged with pink; mid- and hind-tibiae ochreous irrorated with light brown, a large dark patch at extremity; frons ochreous with scattered brown scales; vertex of head, tegulae, patagia and thorax ochreous and light brown tinged with pink; metathoracic crest tipped with dark reddish brown; abdomen ochreous brown, anal tuft lighter. Fore-wings greyish brown with slight lilacine reflexion; subbasal line wavy, black, geminate, enclosing lilacine; antemedial line diffused black; a diffused dark medial shade; postmedial line pale, preceded by interrupted black line and followed by indistinct dark line clearly marked by minute spots on veins 1 and 2, oblique from costa to subcostal nervure, strongly excurved beyond cell, incurved to inner margin; a subterminal line of black spots, large on submedian fold and small above veins 2 and 3; termen dark reddish brown; cilia light at base, dark at tips; orbicular round, dark, slightly defined by ochreous line; reniform oval, ringed with lilacine white excepting at lower end; the space between the spots yellowish with some brown irroration; a lilacine grey apical spot, preceded by dark brown on costa. Hind-wings light brown heavily suffused with dark brown on terminal area; a conspicuous dark brown discocellular spot; basal half of costal area highly iridescent; cilia light brown with dark central band.

Expanse 21 mm.

Hab. Alto da Serra, Santos.

Neostrotia ornata, sp. n.

♂. Palpi inwardly brown, outwardly fuscous; legs fuscous brown sprinkled with grey; tarsi light reddish brown; frons dark purplish brown; vertex of head ochreous white; antennae shaft white; tegulae, patagia, thorax, and abdomen ochreous white irrorated with purplish brown; anal tuft golden brown. Fore-wings yellowish grey, the scales crossed by broad central dark band giving the appearance of fine striae over the whole wing; subbasal line represented by a diffused dark spot on costa; antemedial line very indistinct excepting on costa, where it forms a black spot, fuscous and yellowish below it, angled outwards in cell and on submedian fold, preceded and followed by whitish; postmedial line tawny shading to fuscous below submedian fold, a black spot on costa, excurved from costa to vein 3, incurved to vein 1, then straight to inner margin, followed by whitish; a very wavy subterminal line followed by white space thickly striated with dark fuscous; termen tawny interrupted by black between the veins; cilia tawny speckled

with fuscous, interrupted by white between the veins, wholly white between veins 6 and 7 and above tornus; three oblique white streaks on costa beyond postmedial line. Hind-wings light brown, the striation much less conspicuous than in the fore-wings; a diffused lunular discocellular spot; termen fuscous more or less interrupted at the veins; cilia tawny, white and fuscous. Underside: fore-wings reddish brown suffused and irrorated with fuscous; terminal area white striated with fuscous; hind-wings paler, irrorated, especially on the costal area, with fuscous brown; terminal area striated; a fuscous lunular discocellular spot; indistinct postmedial and subterminal dark bands; termen brown interrupted at veins.

♀. Fore-wings yellower and darker than male, the lines more distinct; a minute black discocellular spot.

Expanse, ♂ 20 mm., ♀ 21 mm.

Hab. Castro, Paraná; Alto da Serra, Santos.

Neostrotia linda, sp. n.

♂. Palpi inwardly brown, outwardly fuscous; legs fuscous brown sprinkled with grey, the tarsi light reddish brown; frons dark purplish brown; vertex of head ochreous white; antennae shaft white; tegulae, patagia and thorax white irrorated with purplish brown. Fore-wings yellowish grey, the scales crossed by dark central band, giving the appearance of fine striae over the whole wing; subbasal line represented by a diffused dark spot on costa; basal area suffused with fuscous in and below cell; antemedial line double, white, filled in with a black spot on costa and fuscous and yellowish below it, angled outwards in cell and on submedian fold; postmedial line double, white, filled in with a black spot on costa and tawny below, shading to fuscous below submedian fold, excurved from costa to vein 3, incurved to vein 1, then straight to inner margin, followed by pure white space with a few black irrorations on discal area; a very wavy subterminal line angled inwards on the veins, followed by white space thickly striated with dark fuscous; a dark diffused spot on discal fold; termen tawny interrupted by black spots between the veins, indistinct near apex, well defined near tornus; cilia yellowish grey speckled with fuscous interrupted by white between the veins, wholly white between veins 6 and 7 and above tornus; a cluster of black irroration on discocellulars; a faint indication of a pale reniform; three oblique white streaks on costa beyond postmedial line. Hind-wings light brown, the striation much less conspicuous than in the fore-wings; a diffused discocellular spot; termen fuscous more or less inter-

rupted at the veins; cilia brown mixed with white. Underside: fore-wings reddish brown suffused and irrorated with fuscous, the terminal area white striated with fuscous; hind-wings paler, irrorated, especially on the costal area, with fuscous brown; a fuscous lunular discocellular spot; well defined postmedial and less decided subterminal dark bands; termen black interrupted at veins.

♀. Basal half of abdomen ochreous white irrorated with dark brown, terminal half clothed with dark fuscous scales tipped with white. Fore-wings darker than in the ♂; the medial area suffused with tawny; the lines, except the subterminal, not so well defined.

Expanse, ♂ 18 mm., ♀ 17 mm.

Hab. Castro, Paraná; São Paulo, S. E. Brazil.

Macapta obliqua, sp. n.

♀. Palpi, head, legs and thorax dark coppery brown; abdomen lighter. Fore-wings dark coppery brown, the costal and terminal areas somewhat lighter in shade; a pure white streak beyond discocellulars widening out at lower end above vein 4; a subterminal series of minute black dots on the veins. Hind-wings yellowish brown at base, suffused with coppery brown on outer half.

Expanse 24 mm.

Hab. Guarujá, Santos.

Bryolymnia castrena, sp. n.

♂. Palpi fuscous mixed with white; basal third of antennae shaft white above, banded with fuscous, the remainder fuscous; frons, head, tegulae, patagia and thoracic crest fuscous, the scales tipped with whitish; thorax white; abdomen ochreous with fuscous lateral hairs. Fore-wings white; basal area black from costa to vein 1, angled outwards on submedian fold; a rufous subbasal striga on costa and some rufous below vein 1; antemedial line represented by black point on costa and on inner margin; postmedial line black, geminate, wavy, oblique from costa to vein 4, incurved from 4 to 1 where it is angled outwards, then incurved to inner margin; an indistinct white, wavy, subterminal line; a large black patch on costa between postmedial and subterminal lines partially covered with fuscous scales with whitish tips; a smaller oblique black mark from vein 3 to vein 5 confluent with a black mark beyond reniform; terminal line dark, interrupted at the veins; cilia brown, lighter at the ends of the veins; orbicular and reniform white defined by black, the former large and oblique, the latter

constricted at middle and almost covered with fuscous and a few rufous scales; the space between the spots filled with black, a black spot above it on costa; medial area slightly and terminal area heavily suffused with rufous. Hind-wings ochreous white suffused with fuscous at apex.

Expanse 25 mm.

Hab. Castro, Paraná.

Near *B. bicon*, Druce; but it is easily distinguished by the white thorax, the black cellular space between the orbicular and the reniform and the curved black mark beyond the cell instead of the square one.

Calymniodes lilacina, sp. n.

♂. Palpi and legs dark brown; tarsi ringed with ochreous; head, tegulae, patagia and thorax light reddish brown; metathoracic crest dark brown; antennae dark brown; abdomen brown. Fore-wings reddish brown; a wavy, whitish subbasal line from costa to vein 1; antemedial line white, indistinctly defined on outer side by black, oblique from costa, a minute outward curve above subcostal nervure, oblique and slightly incurved across cell to submedian fold where it is acutely angled outwards, incurved on vein 1; an indistinct medial dark shade clearly defined on the veins; postmedial line white, sinuous, excurved from costa to vein 4, incurved from 4 to submedian fold, excurved and acutely bent inwards to inner margin, but not confluent with antemedial line, followed by a broad lilacine white shade, ochreous grey at costa; a wavy, lilacine white subterminal line, the veins lilacine white on inner side; terminal area a darker shade of brown; termen dark brown; cilia light at base, dark at tips; orbicular and reniform very indistinct. Hind-wings brown; terminal area suffused with darker brown.

Expanse 32 mm.

In the female the fore-wings are darker and the lines more distinct.

Hab. Alto da Serra, Santos.

Dantona marginata, sp. n.

♂. Palpi light and dark brown mixed; legs brown, tarsi ringed with ochreous; antennae light brown; head, tegulae, patagia and thorax light and dark brown mixed; abdomen light ochreous brown. Fore-wings light brown suffused and irrorated with dark brown; the lines diffused and indistinct; the subterminal line well

defined, oblique from close to apex to vein 6, incurved from 6 to 4 and incurved from vein 3 to tornus, followed by light shade to termen; a terminal series of dark lunular spots between the veins; cilia light and dark brown mixed; orbicular and reniform diffused dark brown indistinctly ringed with light brown. Hind-wings light ochreous brown.

Expanse 26 mm.

Hab. Castro, Paraná.

Erocha irrorata, sp. n.

♂. Palpi dark brown mixed with white and black; pectus white; legs fuscous irrorated with white, the fore femora and tibiae with long white hair; head, tegulae, thorax and patagia dark fuscous mixed with white; a white spot behind the eye; abdomen dark fuscous, a lateral orange stripe. Fore-wings dark fuscous irrorated with white; central area dull green from close to base below cell, along submedian fold, in cell and on discal area, the latter containing large white spot irrorated with green from costa to vein 2, the whole of the green being limited by narrow black diffused line; antemedial line green, visible only on inner margin, outwardly curved, confluent with central green area on vein 1; postmedial line green, visible only at inner margin, inwardly curved, confluent with green area on submedian fold; costa black irrorated with white; median nervure to vein 2 and a bar across cell at this point black irrorated with white; an indistinct subterminal and a terminal line of white irrorations; cilia fuscous. Hind-wings dark fuscous; cilia white. Underside dark fuscous, a large white spot beyond the cell on the fore-wing.

Expanse 40 mm.

Hab. Araçatuba, W. São Paulo.

Subfamily Erastrianae.

Trogoblemma serralis, sp. n.

♂. Palpi, legs and antennae light brown; frons ochreous white with brown at sides; head ochreous white; tegulae ochreous white outwardly suffused with brown; thorax ochreous white with a few scattered dark brown scales; patagia light brown; abdomen ochreous with some scattered brown scales. Fore-wings light brown sparsely irrorated with black and suffused with purplish on costa and terminal area; a faint indication of antemedial line of irroration and medial shade represented by black spot in middle of cell; a black point on discocellulars; an indistinct, diffused, wavy post-

medial line oblique from costa to vein 7, outwardly curved to vein 3 and slightly incurved to inner margin, more distinctly defined on the veins, especially on 6 and 7, followed by darker subterminal shade and lilacine terminal area which is broad at apex; a terminal line of black points between the veins; cilia dark purple brown. Hind-wings ochreous white slightly suffused with light brown on margins; a terminal series of dark spots between the veins; cilia light brown.

Expanse 16 mm.

Hab. Alto da Serra, Santos.

Trogoblemma lilacina, sp. n.

♀. Palpi lilacine mixed with brown; fore- and mid-femora and tibiae thickly clothed with lilacine and brown scales, the tarsi pinkish brown banded with ochreous; hind legs entirely ochreous; head, tegulae and thorax lilacine and brown irrorated with darker scales, the latter posteriorly suffused with lilacine pink; patagia lilacine and brown outwardly suffused with pink; abdomen ochreous. Fore-wings lilacine graduating to rose pink at apex, thickly irrorated with light brown and sparsely with black, the outer half heavily suffused with chestnut brown not extending to apex; the whole of the wing covered with lilacine and pink striae; a small diffused dark spot in cell; a pink discocellular streak; a well-defined lilacine pink postmedial line oblique from costa to vein 7, thence nearly straight to middle of inner margin; a terminal series of black points between the veins; cilia dark purple brown tipped with buff on excavated portions of the wing. Hind-wings ochreous; a dark lunular spot on discocellulars and a terminal series of lunular spots between the veins; cilia ochreous.

Expanse 23 mm.

Hab. Alto da Serra, Santos.

Angitia fuscosa, sp. n.

♂. Palpi 1st and 2nd joints pale reddish brown, 3rd fuscous; legs reddish brown, the tarsi ringed with fuscous; head pale reddish brown mixed with white; patagia, tegulae and thorax fuscous brown mixed with white; abdomen brown irrorated with white, dorsal crests fuscous and white, anal tuft ochreous white. Fore-wings reddish brown heavily irrorated and suffused with fuscous, the apex and tornus paler; subbasal line ochreous brown only visible on costa; antemedial line ochreous brown, indistinct, wavy, excurved

on subcostal nervure and above vein 1; postmedial line double, diffused, black, dentate, oblique from costa to vein 6, strongly angled outwards on veins 1, 2 and 3, followed by broad ochreous white streak from costa to vein 6; orbicular and reniform black irregularly defined by ochreous brown, the interspace black; some rufous suffusion on inner margin before tornus and on termen above tornus; cilia fuscous mixed with ochreous. Hind-wings fuscous; cilia fuscous interrupted by white at the veins.

Expanse 30 mm.

Hab. Castro, Paraná.

Mictochroa costiplaga, sp. n.

♀. Ochreous grey; palpi with some fuscous on 2nd and 3rd joints. Fore-wings ochreous grey; antemedial line pale, broad, preceded and followed by darker narrow diffused lines, the pale space very broad at costa where it encloses a conspicuous purple brown spot; a pale discocellular bar; postmedial line pale, broad, excurved below costa, slightly incurved from vein 4 to middle of inner margin, preceded by darker shade; subterminal line pale, parallel with termen; some pale marks on costa near apex; indistinct dark terminal spots between the veins; cilia uniform ochreous grey. Hind-wings ochreous grey with diffused darker medial, postmedial and terminal bands.

Expanse 25 mm.

Hab. Castro, Paraná.

Mictochroa renata, sp. n.

♂. Palpi ochreous, some fuscous on outer sides; legs ochreous; fore-tarsi fuscous ringed with ochreous; head ochreous white; tegulae ochreous brown; patagia white, brown and fuscous; thorax ochreous brown suffused with fuscous; abdomen ochreous irrorated and banded with fuscous black. Fore-wings ochreous white irrorated with pale ochreous brown and fuscous; a very indefinite antemedial line of irroration incurved below costa and on submedian fold, excurved below vein 1; a black bar of irroration across middle of cell; a V-shaped black mark on middle of costa extending across the cell; a broad fuscous-black space from vein 3 to inner margin confluent with postmedial line; reniform large, ochreous brown, centred and surrounded with white; postmedial line black, indistinct at costa excurved below costa, incurved on discal fold, excurved from vein 5 to 3, incurved from 3 to 1 where it is slightly angled outwards; a subterminal line of diffused dark irroration;

a terminal series of dark lunular spots between the veins; cilia ochreous. Hind-wings ochreous irrorated with light brown.

Expanse 25 mm.

Hab. Alto da Serra, Santos.

Mictochroa rectilinea, sp. n.

♂. Palpi inwardly light brown, outwardly fuscous; pectus ochreous; fore-legs heavily suffused with fuscous, mid- and hind-legs ochreous brown; frons pale reddish brown, the prominence darker; back of head pale reddish brown; antennae ochreous ringed with reddish brown; tegulae, patagia and thorax pale reddish brown mixed with rufous; abdomen ochreous irrorated with dark brown, the dorsal crests dark purple-brown. Fore-wings pale reddish brown; antemedial line oblique, nearly straight, double, filled in with a lighter shade; postmedial line double, straight from costa to subcostal nervure, then bent outwards and excurved to vein 7, incurved on discal fold, excurved above vein 4, bent inwards to lower angle of cell, then straight to inner margin; the medial area from the antemedial to a straight line joining the ends of the postmedial dark purple-brown; an indistinct, wavy, diffused, dark subterminal line, followed by light shade; orbicular represented by a few dark scales; reniform very narrow, slightly excavated on distal side and defined by fine dark line, heavily shaded on proximal side; a dark patch with whitish streaks before apex. Hind-wings ochreous lightly suffused with brown, darker on terminal area; a terminal series of dark lunular spots between the veins; cilia pale reddish brown, a light line at the base.

Expanse 25 mm.

Hab. Castro, Paraná.

Mictochroa fasciata, sp. n.

♀. Palpi fuscous brown; pectus ochreous and rufous; fore-legs suffused with fuscous and rufous, mid- and hind-legs ochreous brown; frons, head, tegulae and thorax rufous, the tegulae edged with light reddish brown; patagia brown with some rufous on the shoulders; abdomen reddish brown heavily irrorated with fuscous. Fore-wings rufous irrorated and suffused with fuscous and purplish brown; antemedial line ochreous, sharply angled outwards on subcostal area, straight to vein 1, then slightly bent outwards to inner margin, preceded and followed by rufous; a slight narrow medial dark shade; postmedial line double, filled in with ochreous, wavy,

straight from costa to subcostal nervure, then bent outwards and excurved to vein 7, incurved on discal fold, excurved above vein 4, bent inwards to lower angle of cell, then straight to inner margin; the medial area, from the antemedial line to a broad whitish fascia joining the ends of the postmedial and crossing reniform, dark purple-brown irrorated with fuscous; a wavy subterminal line preceded by light rufous from costa to vein 3, preceded and followed by fuscous below vein 3; a terminal row of minute dark spots between the veins; cilia brown, tipped with rufous except at tornus. Hind-wings dark brown; cilia rufous.

Expanse 27 mm.

Hab. Castro, Paraná.

Bryocodia altina, sp. n.

♀. Palpi inwardly ochreous brown, outwardly roscate brown; pectus ochreous; fore-coxae roscate brown; fore- and mid-femora and tibiae ochreous suffused with roseate brown and fuscous; tarsi black with ochreous at ends of joints; head and tegulae pale reddish brown, the latter with some scattered dark scales; antennae brown; patagia pale purple-brown, purple-fuscous at extremities; thorax purplish and reddish brown; abdomen ochreous irrorated with dark brown. Fore-wings reddish brown suffused and irrorated with fuscous and various shades of brown; antemedial line wavy, diffused, double, filled in with olivaceous, angled outwards on subcostal and in cell, excurved above and below vein 1; postmedial line double, diffused, the inner line rufous, the outer fuscous brown, filled in with olivaceous on costal area, angled inwards on discal fold, evenly excurved from vein 4 to inner margin, the outer line nearly obliterated below vein 4 by a large white mark suffused with pink from postmedial to subterminal line; some rufous before the white patch; subterminal line obscure, wavy, angled outwards on vein 4, incurved to tornus; termen dark brown interrupted at the ends of the veins; terminal area and cell rufous brown; cilia olivaceous brown; medial area above and below cell purplish grey irrorated with fuscous and rufous; reniform pale, defined by darker rufous brown, a few white scales at lower end; a dark patch on costa before apex, surrounded by white slightly suffused with pink. Hind-wings light brown; cilia ochreous with broad rufous brown band.

Underside: fore-wings light brown; a very pronounced postmedial line, strongly excurved; costal and outer areas buff heavily irrorated with roscate brown; hind-wings ochreous buff sparsely

irrorated with roseate brown; a diffused postmedial line of lunular spots between the veins.

Expanse 30 mm.

Hab. Alto da Serra, Santos.

Bryocodia chlorotica, sp. n.

♀. Palpi white outwardly speckled with fuscous; pectus white; fore-coxae white mixed with reddish brown; fore-femora and tibiae reddish brown and fuscous; mid- and hind-femora and tibiae white mixed with reddish brown and fuscous; frons white with some greenish scales above; vertex of head and tegulae white mixed with pale olive green; antennae reddish brown; patagia white mixed with olive green, a large black spot near base and some dark scales at tips; thorax white mixed with olive brown and fuscous; abdomen ochreous irrorated with brown, some white scales on dorsal crests. Fore-wings pale olive green; subbasal line black from costa to vein 1, interrupted on median nervure, surrounded with silvery white and followed by fuscous suffusion on submedian interspace; some fuscous suffusion below vein 1; antemedial line double, wavy, filled in with silvery white, the inner member very indistinct and the outer diffused, black, wavy, straight from costa to median nervure, angled outwards on submedian fold, inwards on vein 1, excurved to inner margin; a medial dark shade conspicuous on costal area; postmedial line silvery white, strongly excurved from costa to vein 3, incurved from 3 to inner margin, the space on proximal side suffused with white; subterminal line wavy, ochreous brown, preceded by broad fuscous suffusion from vein 7 to tornus; a dark lunular spot on discal fold before termen; a terminal series of dark lunular spots between the veins; cilia reddish brown and fuscous. Hind-wings brown; cilia paler. Underside ochreous white, irrorated and suffused with fuscous brown.

Expanse 25 mm.

Hab. Castro, Paraná.

Bryocodia hilaris, sp. n.

♀. Palpi ochreous, outwardly fuscous; legs ochreous, fore-legs suffused with fuscous; frons ochreous with dark ring round the prominence; back of head ochreous; antennae brown ringed with ochreous; tegulae ochreous, a dark line near base; thorax and patagia ochreous with some fuscous-brown scales; abdomen ochreous, laterally fuscous, the dorsal crests fuscous. Fore-wings white irrorated with brown and fuscous; a minute black spot on base and two more distal on costa and median nervure; antemedial

line black below cell, angled inwards on vein 1, preceded by white; a very oblique medial shade on costa; a white dentate subterminal line, the point between veins 6 and 7 reaching to termen, preceded by dark brown shade; terminal line dark, interrupted at the veins; cilia brown with darker central stripe, interrupted by white at the ends of the veins; subcostal area white, suffused with brown on costa; a large V-shaped silvery white mark at the end of the cell, the lower arm extending to the dark shade before the subterminal line at vein 3 and the upper coalescing with the white subcostal area, defined by fuscous on inner and outer sides, the space between the arms dark brown, some rufous irroration on the white V; a large silvery white space on inner margin from the middle to tornus, touching submedian fold, some brown irroration on the white. Hind-wings ochreous; medial area suffused with reddish brown; terminal area suffused with brown; termen darker brown; cilia ochreous brown, a pale line at base.

Expanse 24 mm.

Hab. Castro, Paraná.

Bryocodia castrena, sp. n.

♀. Palpi, legs and head ochreous; antennae light brown; tegulae, patagia, thorax and abdomen ochreous irrorated with dark brown, the dorsal crests dark purple-brown. Fore-wings pale ochreous brown irrorated and suffused with fuscous; antemedial line obscure, followed by white irroration in and below cell; postmedial line fine, diffused, strongly excurved from costa to vein 3, slightly incurved from 3 to inner margin; a silvery white fascia on basal half of vein 1, a dark suffusion above it; a broad white space suffused with brown from vein 1 to vein 3; white streaks on veins 3, 4, 6 and 7 reaching to termen; a dark streak in upper side of cell and beyond cell interrupted by the reniform; a dark suffusion below origin of vein 2; reniform white suffused with brown and irregularly defined by fuscous, distally excavated; cilia reddish brown with white streaks at the ends of veins 3–7. Hind-wings ochreous suffused with reddish brown; a wavy diffused postmedial line.

Expanse 26 mm.

Hab. Castro, Paraná.

Subfamily Eutelianae.

Eutelia jaguaria, sp. n.

♂. Palpi, 1st joint rufous, 2nd and 3rd brown, fuscous above; pectus and femora rufous; tibiae and tarsi brown; frons and vertex

of head light brown, the ends of the scales dark purplish brown; antennae purplish brown; tegulae light rufous in front, dark brown behind; patagia and thorax dark purplish brown mixed with rufous; abdomen dark purplish brown, some rufous at base. Fore-wings rufous; a wavy black subbasal line angled inwards below costa, incurved below cell, angled outwards on vein 1; a black wavy antemedial line angled outwards in upper and inwards in lower part of cell, excurved below cell to vein 1 and below vein 1 to inner margin; a medial dark shade; post-medial line black, wavy, exeurved from below costa to discal fold, where it is obtusely angled inwards, then inwardly oblique and exeurved to submedian fold, where it is obtusely angled inwards, then excurved to inner margin, followed by broad pale rufous band to subterminal line; subterminal line wavy; terminal area fuscous, a dark triangular patch on costa before apex; termen fuscous; cilia fuscous with light brown line at base; a large fuscous space from before antemedial line from costa to vein 1, including cell and space above; orbicular obliterated by the fuscous shade; reniform rufous defined by yellowish line, excurved on distal side. Hind-wings white heavily suffused with fuscous on outer half; traces of postmedial and subterminal lines. Underside: fore-wings ochreous white suffused with fuscous, heaviest at termen; a pale patch on discocellulars followed by some rufous suffusion beyond upper angle of cell; a diffused dark postmedial line; hind-wings white suffused with rufous and fuscous; a fuscous discocellular spot; traces of postmedial and subterminal lines.

Expanse 32 mm.

Hab. Jaguariahyva, Paraná.

Paectes viridescens, sp. n.

♂. Palpi inwardly ochreous, outwardly purplish on 1st joint, purplish and brown on 2nd and brown on 3rd; pectus and coxae white; legs light brown irrorated with darker brown; frons ochreous white with dark brown bar; cheeks purplish; head ochreous white and olive green; antennae and basal tufts purplish brown; tegulae ochreous and brown suffused with pale olive green in front and a large purplish brown basal spot; thorax reddish brown mixed with dark brown and white; patagia white, reddish brown and dark brown, some olive green on the shoulder; abdomen ochreous white, dorsally suffused with rufous on segments 3–5, the suffusion broadest on segment 4, segments 2–5 with irregular distal black rings, confluent with sublateral spots on 4 and 5, underneath white, a central row of large black spots placed proximally and a double row of

minute ones distally on the segments. Fore-wings greyish white, the basal area to orbicular suffused with olive green including the antemedial line; a double dark, sinuous subbasal line with confluent spot on median nervure, angled outwards on subcostal and inwards on submedian nervure; antemedial line wavy, double, the outer line indistinct and touching orbicular, incurved in cell, outcurved below and strongly angled inwards on vein 1; a wavy, fine, dark medial shade strongly angled inwards on vein 1; postmedial line wavy, dark, double, oblique from costa to vein 7, strongly excurved beyond cell, incurved below vein 4, strongly incurved on vein 1, filled in with green at costa and on submedian and inner areas, followed by pale olive green suffusion limited on outer side by a diffused dark line; an indistinct diffused subterminal line expanding into a spot on vein 1 and followed by elongated spots above veins 4, 5 and 6; a wavy black terminal line; cilia light brown, a fine grey line at base and tips, interrupted by fuscous at the ends of the veins; a rufous triangular spot at costa before apex; some pale green suffusion on medial area at each side of vein 1, in cell and on costal area; orbicular round, white, with greenish suffusion, distally defined by black; reniform white with some green suffusion and a fuscous discocellular bar, excavated on outer side and defined by black, followed by strongly excurved black line across discal fold. Hind-wings light fuscous brown, the veins darker; base ochreous; inner margin white irrorated with fuscous; cilia ochreous white interrupted by fuscous at the ends of the veins.

Expanse 28 mm.

Hab. Alto da Serra, Santos.

XIV. *Notes on the Life History of* Papilio demolion, *Cram.*

By Margaret E. Fountaine, F.E.S.

[Read June 3rd, 1914.]

Plate LXVI.

I have, I suppose, at different times, bred some twenty to thirty species of tropical Papilios, mostly from ova, in various parts of the globe, but never have I seen anything the least like the peculiar method of ovipositing adopted by *Papilio demolion*, Cram.

We were collecting at Soekaboemi, in Java, on Feb. 6 in this year (1914), when I observed a ♀ of this species hovering over a broad-leaved jungle shrub (quite unknown to me), with the evident intention of ovipositing, and though *P. demolion* was common at Soekaboemi, and I had captured several specimens, not one was ever perfect, so I was glad to see a possible opportunity of breeding it. She took some time to make up her mind, as Papilios, and indeed all ♀ butterflies do, when an anxious entomologist is standing motionless by, watching her movements, on the tiptoe of expectation; but she settled at last, right in the centre of one of the large leaves, and then, strange to say, remained also apparently quite motionless, with wings outspread lying flat upon the leaf, more as though resting than with the desire to lay an egg, though the position of her abdomen suggested that such was her intention. This in itself struck me at once as most peculiar, as all the other Papilios I have ever seen oviposting (including *P. erithonius* and *P. polytes*, which one would suppose to be closely allied species to *demolion*) fly from leaf to leaf, laying each ovum separately, fluttering all the time in the same way that the members of this genus have the habit of doing when sucking honey from a flower.

She remained in this position for at least two whole minutes, apparently motionless, and I remained the same, watching, till at last she got up and flew away, when to my astonishment I found, not one egg, but ten, rising in a vertical column from the centre of the leaf, placed one above the other, as shown in the Plate (see Plate LXVI, fig. 1).

I now recalled having more than once observed these little pinnacles of ova on lime and lemon leaves when I had been searching for the larvae of other Papilios, but attributing them to the eccentricities of some moth, had thought no more about it. These, however, I, of course, took carefully back to the hotel, and on Feb. 14, eight days later (the usual period with Papilios being five or six days) nine out of the ten ova became healthy little larvae.

They hatched on the morning of the day I was leaving Soekaboemi, and the next day I was on board ss. Houtman, the Dutch steamer, *en route* for Brisbane; but of course I was feeding them on lime leaves, which I felt sure would always be procurable at all the different ports we were to touch at on the way.

The young larvae were very distinct from other Papilios, being of a deep bright ochre-yellow all over, very shiny in appearance, and most sociable in their habits, for always when not feeding they would sit closely packed together on one leaf, and if one or two for a short time got isolated from this family gathering they soon rejoined the group.

These larvae had been slow to hatch, but they had evidently no intention of being slow to grow now that they had hatched, for once outside their egg-shells they grew rapidly, the first moult being successfully achieved when only three days old, and they moulted again three days later, so that when only a week old they were already in the third skin. Unfortunately two died, but the remaining seven were getting on just as well as though they were on dry land, in fact I think the heat of my cabin was partly accountable for their rapid progress. They retained their bright ochre colour, with no white markings of any kind, throughout the first four stages, and they also retained their preference for each other's society, especially just before a moult was due to take place, when two or three would lie side by side awaiting the event.

Just before the end of the fourth stage a greenish tinge was visible beneath the shiny surface of ochre-yellow. This larvae at the beginning of the fifth moult was one of the prettiest I have ever seen, the usual green being replaced by a soft cobalt blue, only very slightly tinged with green, which, however, deepened as they grew older, though the blue tone was always the most prevalent, until the larva was hanging up for pupation, and then it entirely gave place to pale green.

I much regret not to have been able to draw this larva in its early stages, but on board ship this was impossible, especially as when the boat was motionless at the various ports, we were always much too busy on shore, searching for orange and lemon trees, or indeed any kind of *Citrus*, on which to feed, not only the *P. demolion*, but some fifty or sixty large larvae of *Papilio memnon*,* besides eight young larvae of some other Papilio, brought in on branches of lime, at Macassar (Celebes). The first *demolion* to pupate was on the very day we arrived at Brisbane, having therefore spent the whole of its larval existence at sea; and the others soon followed its example, but luckily not before I had had time to make a drawing of one of them. (See Plate LXVI, fig. 2.)

The pupa of this remarkable butterfly is also very distinct (see Plate LXVI, fig. 3), especially by the long projection below the thorax. As usual, those that pupated on the food-plant were green, and those which selected the side of the cage were brown.

* I was told by my friend Mrs. Walsh of Soekaboemi that *P. memnon* in Java has no less than six different forms in the ♀, and that was, of course, why we were breeding so many of them. Mrs. Walsh also told me that she was not acquainted with the ova of *P. demolion*, but had often found the larvae on lime trees, always, however singly, which can no doubt be accounted for by the other members of that group having fallen a prey to their innumerable enemies.—M. E. F.

Explanation of Plate LXVI.

Fig. 1. Egg-pile of *Papilio demolion*, Cram.
„ 2. Larva „ „ „
„ 3. Pupa „ „ „
„ 4. Imago „ „ „

All the figures are of natural size.

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LIFE HISTORY OF PAPILIO DEMOLION.

XV. *Some remarks on the Coccid genus* Leucaspis, *with descriptions of two new species.* By E. Ernest Green, F.E.S.

[Read October 7th, 1914.]

Plates LXVII, LXVIII.

The following species have, at various times, been allotted to the genus *Leucaspis* :—*affinis*, Leon.; *bambusae*, Kuw.; *candida*, Targ.; *cockerelli*, de Charm.; *cordylinidis*, Mask.; *corsa*, Lind.; *cupressi*, Coleman; *ephedrae*, March.; *epidaurica*, Genn.; *gigas*, Mask.; *indica*, Marlatt; *indiaeorientalis*, Lind.; *japonica*, Ckll.; *kelloggi*, Coleman; *kermanensis*, Lind.; *leonardi*, Ckll.; *loewi*, Colvée; *monophylla*, Murray; *pini*, Hartig; *pistaciae*, Lind.; *pusilla*, Loew; *riccae*, Targ.; *signoreti*, Targ.; *stricta*, Mask.; and *sulci*, Newst.

These twenty-five names have since been considerably reduced in number, partly by allocation to other genera and partly by suppression as synonyms. These changes in nomenclature have been put forward by Leonardi and Lindinger (not always in complete agreement) in two useful papers published in 1906, viz. Leonardi "Saggio di Sistematica delle Leucaspides," Anneli di Agr., vi; and Lindinger, "Die Schildlausgattung Leucaspis," Jahr. Hamb. wiss. Anst., xxiii.

L. affinis, of Leonardi, in the opinion of Lindinger, is a synonym of *candida*, which—in its turn—is suppressed by Leonardi as equivalent to *pini*. Leonardi distinguishes his species from *pini* by its smaller size and the fewer number of glandular pores outside the anterior spiracles. Lindinger, however, disputes the authenticity of *L. pini* of Hartig.

L. bambusae, of Kuwana, is relegated by Lindinger to the genus *Lepidosaphes* (*Mytilaspis* of Signoret). Kuwana's figures of his species (Pr. Cal. Ac. Sci., 3, iii, Pl. XIII, figs. 75–81) show unmistakably that it cannot be included in *Leucaspis*; but, in the absence of male puparia, it might be assigned, with equal justice, to either of the two genera *Lepidosaphes* or *Chionaspis*.

L. candida, Targ., as noted above, has been alternately extinguished and rehabilitated, by Leonardi and Lindinger respectively. The latter author is convinced that, in describing *Aspidiotus pini*, both Hartig and Bouché were dealing with a different insect, and he accordingly adopts the name *candida* of Targioni as the earliest definition of the species attributed by later writers (Signoret, Berlese and Leonardi) to *pini*.

L. cockerelli, of de Charmoy (originally described under the generic name *Fiorinia*), is a very distinct species about which there can be no question.

L. cordylinidis, of Maskell, appears to be rightly placed in this genus. Maskell's description of the female puparium as having the "pellicles terminal, small," is misleading. Examples in my collection (received from Maskell himself) show that the nymphal pellicle has the characters of typical *Leucaspis*, being large, concealed beneath the secretionary covering, and completely enclosing the body of the adult female.

L. corsa, of Lindinger, was subsequently recognised by that author as being equivalent to *signoreti*.

L. cupressi, Coleman. The author's description and figures (Jn. N. Y. Ent. Soc., xi, p. 71) are sufficient proof that this insect is not a *Leucaspis*. It is probably correctly allocated (by Lindinger) to the genus *Lepidosaphes*.

L. ephedrae, Marchal, appears to be a well-defined species.

L. epidaurica, of Gennadius, has been shown by Leonardi and Lindinger to be equivalent to *riccae* of Targioni.

L. gigas, of Maskell, originally described as a *Fiorinia*, has been correctly relegated, by Lindinger, to the present genus.

L. indica, Marlatt, has characters that sufficiently distinguish it from all other members of the genus.

L. indiae-orientalis, Lind. Judging by the figures given by Dr. Lindinger, this species must be very near to his *kermanensis*. They both occur in the Oriental region; but the striking difference in the food-plant (*indiae-orientalis* affecting Pinus, while *kermanensis* occurs on the Salix tribe) suggests that the similarity must be more apparent than real.

L. japonica, Ckll. This is recognised, by both Leonardi and Lindinger, as a good species; but, after comparison with typical examples of *riccae*, it appears to me to be

rather doubtfully distinct from that species. The characters of the adult females are, as far as I can see, identical. The most noticeable difference is in the form of the pygidial lobes of the nymphal pellicle, which are conspicuously tricuspid in *japonica* (see fig. 7), while in *riccae*—though varying to a certain extent—the margin of the lobes is comparatively entire. Originally described from Japan, the species has since been recorded from Brazil. I have also received it from India, where it occurs on *Ficus religiosa*. (See further particulars below.)

L. kelloggi, Coleman. Coleman's species, as pointed out by Lindinger, has none of the characteristics of the genus *Leucaspis* and is probably referable to *Lepidosaphes*.

L. kermanensis, of Lindinger, is characterised by the comparatively simple margin of the pygidium of the adult female, which is without either plates or prominent lobes. As noted above, the same author's *indiae-orientalis* approaches this species very closely. In *salicis*, mihi (described below), a similar condition occurs.

L. leonardi, Ckll. This is now recognised, by both Leonardi and Lindinger, as a synonym of *pusilla*.

L. loewi, Colvée. Both Leonardi and Lindinger agree in regarding *loewi* and *sulci* as representing a single species; but they differ in their opinion as to which of the two names should be retained. While Leonardi accepts *leowi* as the older name, Lindinger disputes its authenticity and adopts Newstead's name—*sulci*.

L. monophylla, Murray. Little seems to be known about this insect, except that it was recorded as occurring on pine trees in Europe. Lindinger places it on his list, with a query. Mrs. Fernald relegates the name to her list of "species without description or not recognisable," and adds a note—on the authority of Cockerell—that it is "probably a *Monophlebus*."

L. pini, Hartig. This name—as regards its synonymy with *candida*, Targ.—is in the same position as *leowi* with *sulci*. Leonardi accepts *pini*, while Lindinger rejects that name and adopts *candida*.

L. pistaciae, of Lindinger, is well characterised by the single pair of large median lobes on the pygidium of the adult female.

L. pusilla, Loew, shows a curious variability of the marginal fringe. The plates may be either spatulate, or irregularly serrate, or both conditions may occur together.

The lobes may be asymmetrically disposed, one or more of them being often missing. The median plates are occasionally fused together, as represented in Leonardi's figure.

L. riccae, Targ., is undoubtedly a good species. Even should it prove to be identical with *japonica*, the name *riccae* has priority.

L. signoreti, Targ. The authenticity of this name remains undisputed.

L. stricta, Mask. Originally described as a *Fiorinia*, this insect has been justly relegated to the genus *Leucaspis* by Leonardi, in which decision he is followed by Lindinger.

L. sulci, Newst. This species also originally figured under the genus *Fiorinia*. It is now recognised as equivalent to *Leucaspis loewi*; but, as noted in my remarks upon that species, there is a question as to which specific name should be retained.

To the above catalogue I now propose to add two new names, viz. :—

L. perezi, from Pinus, in the Canary Islands; and
L. salicis, occurring on Salix : Beloochistan.

Detailed descriptions of these two species appear below.

Eliminating synonyms and disputed names, we have the following seventeen species remaining in the genus :—

1. *indiae-orientalis*, Lind.
2. *loewi*, Colvée (=*sulci*, Newst.)
3. *perezi*, Green.
4. *pini*, Hartig (=*candida*, Targ.=*affinis*, Leon.)
5. *pusilla*, Loew (=*leonardi*, Ckll.)
6. *signoreti*, Targ. (=*corsa*, Lind.)

(1–6: six species, affecting Pinus.)

7. *cockerelli*, de Charm.
8. *cordylinidis*, Mask.
9. *stricta*, Mask.

(7–9: three species, on various Monocotyledons.)

10. *ephedrae*, March.
11. *gigas*, Mask.
12. *indica*, Marlatt.
13. *japonica*, Ckll.
14. *kermanensis*, Lind.
15. *pistaciae*, Lind.
16. *riccae*, Targ. (=*epidaurica*, Genn.)
17. *salicis*, Green.

(10–17: eight species, on various Dicotyledons.)

Leonardi divides the genus into three subgenera, which he defines as follows :—

I. Pygidium furnished with "pectines" (= "plates," of Comstock).

A. Pygidium with "trullae" (="lobes") *Leucaspis* (s. str.).

B. Pygidium without "trullae" . . . *Anamaspis.*

II. Pygidium without "pectines" . . . . *Actenaspis.*

His *Anamaspis* was erected to contain the single species *loewi* (=*sulci*), but would now include *indiae-orientalis*, *kermanensis*, *pistaciae* and *salicis.*

His *Actenaspis* was similarly made to contain a single species—*pusilla.* He designates the marginal processes of this species by the term "appendices," differentiating them from the "pectines" attributed to the species that he restricts to *Leucaspis.* I fail to see in what essential particular these processes on the pygidium of *pusilla* differ from those of *pini*, or *signoreti.* They arise in the same manner and from the same area in all three species, and I hold them to be strictly homologous structures.

Leucaspis perezi, sp. nov.

Puparium of female narrow, of normal form : consisting of the blackish larval and nymphal pellicles thinly veiled by a white secretionary covering which extends as a narrow border surrounding the nymphal pellicle. Length 1·25 to 1·8 mm. ; the average length being approximately 1·5 mm. Larval pellicle dark brown, brownish-ochreous at the anterior and posterior extremities. Nymphal pellicle black or very dark brown, paler at posterior extremity. Length of nymphal pellicle 1·15 to 1·5 mm. ; average length of 20 examples 1·28 mm.

Male puparium white : larval pellicle dark olivaceous brown. Length 1·5 to 2 mm.

Adult female (fig. 1) of normal form, narrowing to the rounded cephalic extremity; widest across abdomen the sides of which are broadly rounded and constricted rather abruptly at the base of the pygidium. Rudimentary antennae conspicuous, consisting of a chitinous tubercle surmounted by from 3 to 4 stout spine-like setae. Tentorium very large and conspicuous. Anterior spiracles situate close to tentorium ; posterior spiracles at junctions of thoracic and abdominal areas ; the two pairs widely separated. A small group of from 5 to 6 parastigmatic pores above the anterior spiracles. In

many examples there is a well-marked rugose thickening of the derm on the median dorsal area. Pygidium rounded. Anal aperture surrounded by a circumscribed thickened area. Dorsal surface of pygidium longitudinally rugose; with eight irregular oblong patches of denser chitin. All these denser areas are rendered more conspicuous by their taking a deeper stain than the surrounding parts. Circumgenital glands in a scattered arch, containing a variable number of (from 30 to 45) pores: the average of twenty examples giving 39. Margin of pygidium (fig. 2) with six narrow lobes which taper to a blunt point. Marginal processes long and slender, spatulate, extending twice the length of the lobes: 2 between median lobes, 2 between median and first lateral, 3 between first and second laterals, and from 7 to 10 beyond the second lateral lobe. There is a long and slender marginal spine after the first marginal process, in the interspace between the two lateral lobes, and another after the second or third process beyond the outer lateral lobe: other smaller spines at intervals, and an irregular submarginal series of about 20 small spines on conspicuous circular bases. Length 0·65 to 0·8 mm.

Adult male not observed.

The nymphal pellicle (fig. 3) shows the following peculiarities. The cephalic area is strongly demarked and bears a central scar of definite and constant form, as shown in figure. The rostrum is disposed immediately below the centre of the body. The pygidium has a sharply defined disc separated from the marginal area and bearing about 14 conspicuous dorsal pores. The margin (fig. 4-*a*) displays 4 lobes, widest at extremity. In each interspace between the lobes is a single large lunate pore from which arises a pair of broad fimbriate squames, and a varying number of similar pores (of which 4 are usually larger and more conspicuous) beyond the lobes on each side. In older examples the marginal characters are partially obscured.

Habitat, on *Pinus halepensis* and *P. canariensis*: Santa Ursula, Teneriffe, Canary Islands. Collected by Dr. Perez, to whom the species is dedicated.

Leucaspis perezi most nearly resembles *L. pusilla* of Loew. The puparium is of small size, as in that species, but is much darker in colour, the pellicles being blackish instead of fulvous. The pygidial processes of the adult female are of very much the same character in the two species, but—in *perezi*—are more constant in number and more uniformly spatulate in form. The most noticeable differences occur in the nymphal pellicle, as may be

appreciated by reference to figs. 3, 4-*a*, 4-*b*, and 5. These differences are further shown in the annexed comparative table :—

Nymphal pellicle.	*perezi.*	*pusilla.*
Length . .	1·15 to 1·5 mm.	1·0 to 1·15 mm.
Average length .	1·28 mm.	1·06 mm.
Cephalic extremity	Strongly demarked: with conspicuous scar	Not demarked: without scar.
Rostrum . .	Approximately central	Much nearer posterior extremity of body.
Pygidium . .	With sharply defined median disc	Median disc ill-defined.

The pellicle of *pusilla* (fig. 5) is shorter but proportionately broader; the large lunate pores and marginal incisions are conspicuous almost to the base of the pygidial area, there being usually 9 of them beyond the lateral lobe; while, in *perezi*, not more than 4 are clearly noticeable in the corresponding position, the remainder being obscured by a thickening of the margin.

Leucaspis salicis, sp. nov.

Female puparium comparatively short and broad. Pellicles dark brown : larval pellicle exposed : nymphal pellicle thinly veiled by a greyish-white secretionary covering which extends slightly beyond the margins of the pellicle itself. Length 1·0 mm. Breadth 0·65 mm.

Male puparium ochreous white, the single pellicle ochreous. Proportionately narrow. Length 1·0 mm. Breadth 0·45 mm.

Adult female enclosed within the nymphal pellicle : broadly oval (fig. 10), constricted at base of pygidium. Rudimentary antennae with 3 or 4 stout setae. Rostrum large and conspicuous. Anterior spiracles close to the rostrum, one on each side : one or two isolated pores representing the parastigmatic glands. Pygidium (fig. 11) with 4 very small and inconspicuous lobes which scarcely project beyond the margin and are often quite indistinguishable. There are no fimbriate squames or marginal fringe of any kind; but a few minute spines, on circular bases, are set at intervals along the distal half of the pygidium. Anal orifice rather inconspicuous, central. Circumgenital glands in a scattered row (containing about

24 pores) across the base of the pygidium. An isolated pore on each side of each of the two preceding segments. Length 0·45 to 0·5 mm. Breadth 0·3 to 0·4 mm.

Nymphal pellicle (fig. 12) rather broadly oval, narrowed behind. Often with an irregular fold demarking the cephalic area. Rostrum occupying a position immediately behind the centre of the body. Abdominal segments well defined by transverse folds. Extremity of pygidium (fig. 13) with a single median pair of large broad chitinous lobes of irregular form. Two lunate marginal pores are noticeable on each side, at some little distance from the median pores, at which point the series is diverted inwards. Length of pellicle 0·75 mm. Breadth 0·5 to 0·6 mm.

Habitat, on stems, branches and twigs of willow (*Salix* sp.): Mushki, Beloochistan. Collected by Mr. V. Iyer, of the Forest Research Institute, Dehra Dun. The scales are so thickly massed on the bark that they must seriously affect the health of the plant.

The character of the pygidium of the adult female suggests close affinity with *L. kermanensis*, of Lindinger, which also occurs on Salix, in Persia; but the pygidial margin of the nymph of that species (as figured in Lindinger's paper) displays two pairs of comparatively narrow lobes and many stout conical processes, while that of *salicis* is furnished only with a single median pair of extremely broad lobes. Unfortunately, I have been unable to procure typical examples of *kermanensis*, for comparison.

Leucaspis japonica, Ckll.

Cockerell's account of this species (Psyche, viii, p. 53, 1897) refers to the nymphal insect only.

Leonardi was unable to obtain the adult form, material received from the author of the name being in bad condition.

Lindinger appears to have been more successful, as he describes and figures all three stages of the insect. These figures have enabled me to identify as *japonica* a *Leucaspis* collected by Dr. Annandale on *Ficus religiosa*, in India. The following notes are drawn up from these Indian examples.

The nymphal pellicle (fig. 6) shows a more or less symmetrical division into median and lateral series of chitinous plates which are more complete on the hinder segments. The rostrum which, in the example figured, is shown above

the middle, is usually displaced to a position much nearer the posterior extremity of the body. The four pygidial lobes are conspicuous and prominent, each distinctly trilobulate (fig. 7). Length of pellicle 1·25 to 1·5 mm.

Lindinger describes the nymph as possessing, on each side of the pygidium, a small group of pores similar to those of the circumgenital glands of the adult female. I have failed to find these organs on the nymphal pellicles of my Indian examples; but they show a small group of oval dorsal pores occupying the position indicated in Lindinger's figure.

My examples of the adult female show a longitudinal series of small conical tentacular processes on each side, on a fold embracing the rostrum and the two pairs of spiracles (fig. 8). These do not appear to have been noted by previous observers. The rostral apparatus is unusually large and conspicuous. In addition to the circumgenital series of glands, there are two small supplementary groups (of from 4 to 5 pores) on each side, situated respectively on the two preceding abdominal segments. The pygidial lobes are stout and lanceolate: the marginal fimbriate plates long and slender (fig. 9).

I have examined two separate gatherings, labelled respectively "on twig of *Ficus religiosa*, associated with *Lecanium nigrum*, Calcutta, Jan. 1896," and "on Pepul tree, Rajmahal, Bengal." In the former, the puparia are of a dirty greyish-white colour, while in the latter they (both male and female) are stained of a reddish tint assimilating them to the colour of the bark to which they are attached. Cockerell describes his examples as being "whitish with a strong greyish-ochreous tinge, exactly the colour of the twig on which they rest." It would appear therefore, that the insect has the power of altering the tint of its secretions to match its surroundings.

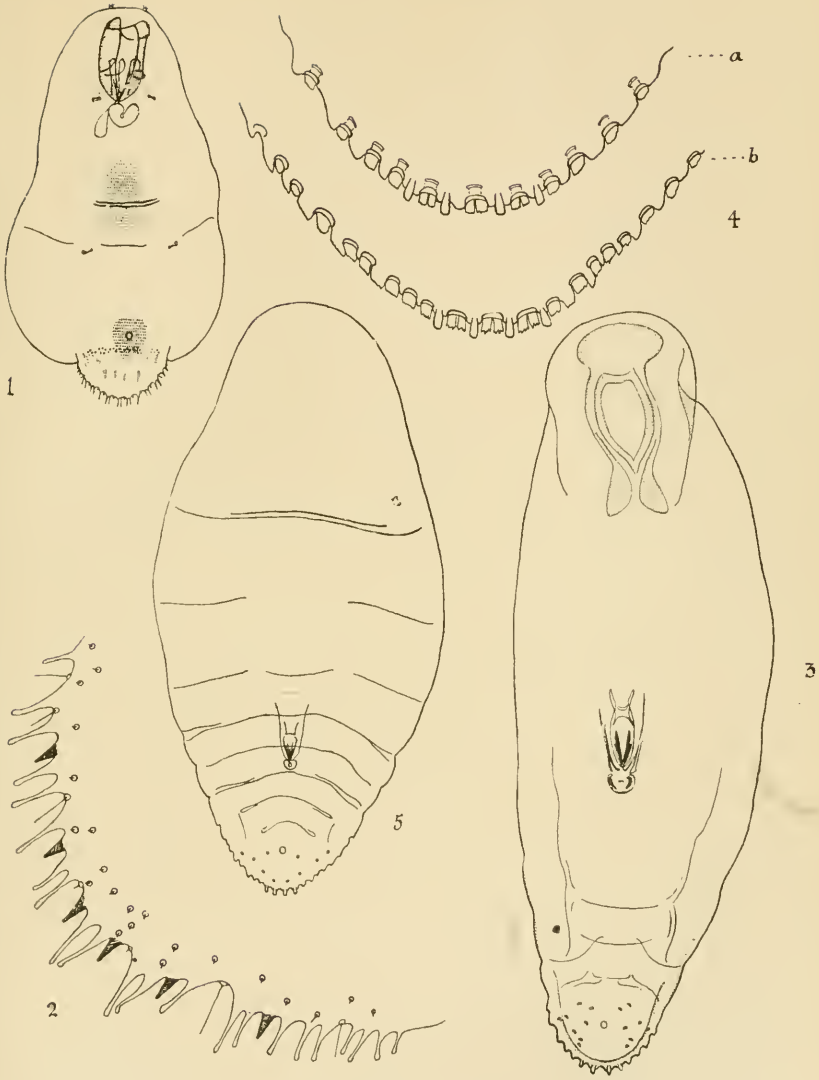
Explanation of Plates LXVII, LXVIII.

PLATE LXVII.

Fig.		
1.	*Leucaspis perezi*,	adult female, × 72.
2.	,,	pygidium of adult female, × 458.
3.	,,	pellicle of nymph, × 72.
4–*a*.	,,	posterior margin of nymphal pellicle, × 260.
4–*b*.	*Leucaspis pusilla*,	posterior margin of nymphal pellicle, × 260.
5.	,,	nymphal pellicle, × 72.

PLATE LXVIII.

6.	*Leucaspis japonica*,	nymphal pellicle, × 58.
7.	,,	posterior margin of nymphal pellicle, × 258.
8.	,,	adult female, × 120.
9.	,,	pygidium of adult female, × 258.
10.	*Leucaspis salicis*,	adult female, × 70.
11.	,,	pygidium of adult female, × 258.
12.	,,	nymphal pellicle, × 70.
13.	,,	posterior margin of nymphal pellicle, × 450.



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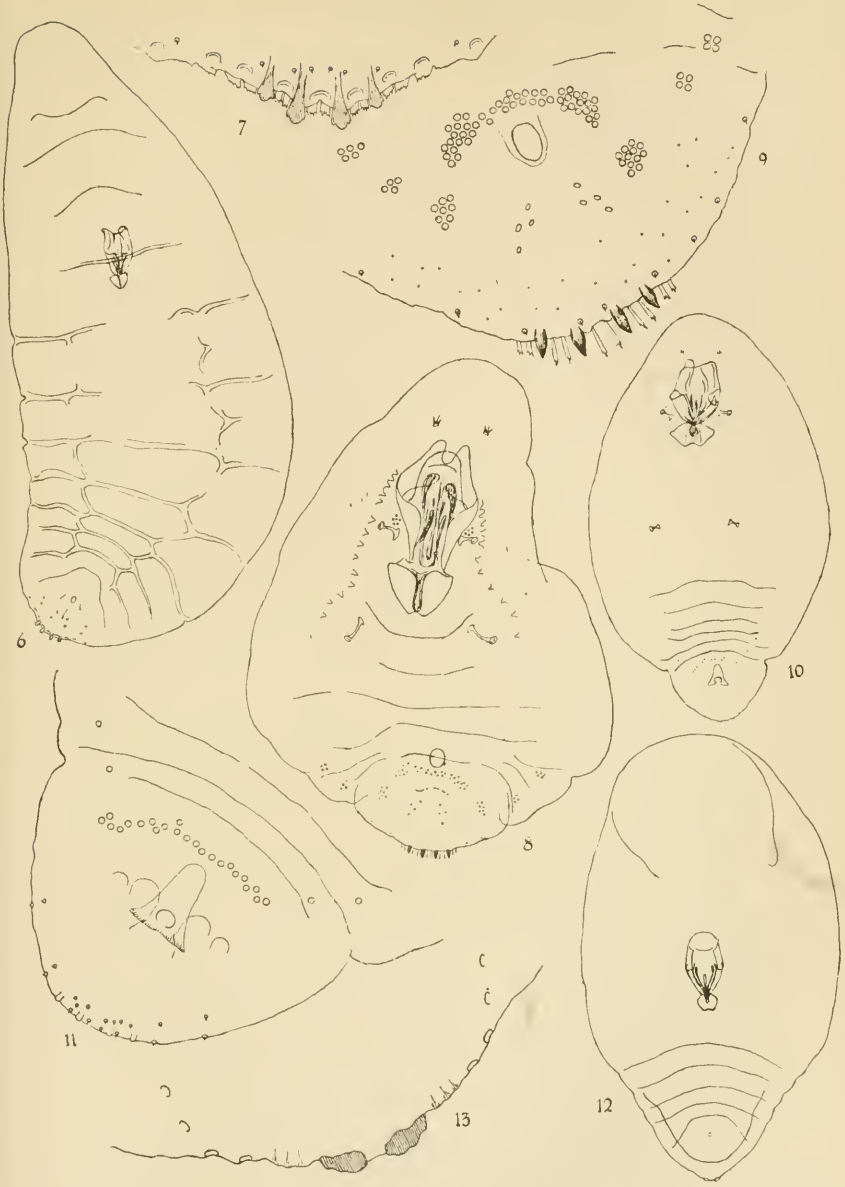
LEUCASPIS PEREZI, 1–4a.
,, PUSILLA, 4b, 5.



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LEUCASPIS JAPONICA, 6–9.
,, SALICIS, 10–13

XVI. *Contributions to the Life History of* Polyommatus eros.

By T. A. Chapman, M.D., F.Z.S.

[Read October 7th, 1914.]

Plates LXIX–LXXXIV.

I had long had a wish to know something of the life-history of *Polyommatus eros* and to see its, so far, unknown larva. The first practical step was, of course, to determine its food-plant (or food-plants). No satisfactory opportunity to do this occurred to me until in July 1912, at Val d'Isere, I found the species not uncommonly. It occurred most freely where *Oxytropis campestris* grew, and I succeeded in observing a butterfly laying its eggs on this plant.

As I note later, I secured some eggs and got the larvae into hibernation, but got none past the hibernating (third) instar.

At Le Lautaret, from the 21st July to the 5th August 1913, *P. eros* occurred practically everywhere. It was certainly most abundant at two or three places where *Oxytropis campestris* grew in quantity, and less so when the *Oxytropis* was more scattered in growth. It was also fairly common in places where *Astragalus aristatus* flourished. Its more general distribution in smaller numbers probably depended on *Phaca astragalina*, which was not often abundant but grew almost everywhere. The butterfly was seen to lay eggs on these plants, and the larvae ate them readily. There was also a plant, *Astragalus onobrychis*, which grew freely in one or two spots at Bourg d'Oisans, much below the limits of *P. eros*, but the leaves and seed pods of which seemed so very much like those of *O. campestris*, that I offered it to the larvae of *P. eros* and they ate it as readily as the *Oxytropis*. With these four plants nearly equally acceptable to the larvae, it is very unlikely that there are not other allied plants that they would also readily eat. The butterflies were seen at various elevations. Nearly as low as 5000 feet towards Monetier where the food-plant was probably the *Astragalus aristatus*, and up to 7500 feet where *Oxytropis campestris* was abundant. They probably occurred

much higher, but suitable localities, *i. e.* areas of food-plants, did not happen to be met with. The ♂♂ were seen abundantly during the whole period noted, July 21 to August 5, but it was only towards the end of the period that the ♀♀ were seen in any numbers.

Though the larva of *P. eros* is quite properly described as hitherto unknown, it is the case, as I learned from M. Rondou when I saw him this summer (1914), that he had bred *P. eros* from larvae found on *Oxytropis pyrenaica*, a plant closely resembling *Phaca astragalina* (or a plant very close thereto, on which *eros* feeds at Le Lautaret), one of the alternative foods on which *P. eros* larva feeds. In admitting some haziness as to this plant, I must plead that there are a good many species, or at least several, that are so much alike, that I at least cannot distinguish them when only the leaves are available.

In both 1912 and 1913 I succeeded in getting a fair number of larvae to go into hibernation, but failed to bring any through the winter of 1912–1913. The following winter I was more successful, by means of keeping the larvae iced during the winter, and bringing them up early and forcing them, as I found they were beginning to die off. Of these I succeeded in getting only one into its last instar, when it also finally died. The unsuccess was probably facilitated by the food-plant having to be forced as well as the larvae and was rather drawn up and succulent.

Eggs were laid at the end of July by females taken on the Route de la Thouviere, Val d'Isere; the males were common in many places near Val d'Isere, the females were however rather scarce. The young larvae hatched during the first week in August, they were placed on *Oxytropis campestris* and eat it readily; the eggs also were laid on this plant, but not on any other offered them, this was suspected to be *the* (or a) food-plant from being present wherever the butterflies were at all common. They afterwards eat also a plant that was brought home last year as *Phaca astragalina* as food for *L. pheretes*, but was seen this spring to be different from other specimens brought as that plant. It was supposed to be possibly *Hippocrepis*, which it very closely resembles, but is seen to possess a more hairy leaf with a raised midrib below (flowers not seen). At any rate *eros* eats it readily, but will not look at *Phaca* or *Hippocrepis*.

At Le Lautaret in 1913 the butterflies in captivity laid freely on *Oxytropis campestris* and *Astragalus aristatus*, and the larvae eat both these plants with equal readiness. *Phaca astragalina* (?) was less welcome to butterflies for laying, and to larvae for eating, but was obviously quite a practicable food-plant.

The egg is almost exactly 0·5 mm. in diameter and about 0·26 mm. high. The top can hardly be called flat, certainly not as it is in *coridon*, etc., *i. e.* there is not a definite line at which the flat top ends and the rounded side begins; the curve of the side seems to be continuous right on to the top, and falls a little into the micropylar hollow. The micropylar area is about 0·075 mm. in diameter. Its structure and the sculpture of the egg may be gathered better from figures 14 to 17 than by long description. The cells of the egg sculpture maintain their full size close up to the micropyle, where there is a slight tendency for them to have their dividing walls arranged radially. The cells are about 0·025 mm. in diameter, there are distinct but very small knobs at the junctions of the walls of the cells.

The eggs are laid on the undersides of the leaflets of the food-plant.

When it leaves the egg, the larva eats approximately the upper half of the shell, the instances are comparatively rare in which it does not eat the whole of the top and more or less of the sides, with some regularity all round.

The newly hatched larva is less than 1 mm. in length, nearly colourless, faint ochreous, hair bases dark, head black, legs dark. In the 2nd instar it is rather larger, much the same in colour, but the black hair bases are very pronounced though less conspicuous after the larva has grown a little, when it exhibits (differing a little in individuals) some traces of darker oblique markings. The 3rd instar was assumed about 3rd September (some earlier, some later).

The larva in this instar is at first somewhat featureless. When somewhat grown it may be noted as on Sept. 10, length 3·5 mm., colour pale ochreous, with sufficient green to give an olive tone especially to the front segments. Head black, legs ochreous like body; outline (anterior or posterior view) angular, with the Lycaenid dorsal and lateral flanges, the former rather rounded, but both accentuated by the more abundant and longer hairs, which

are pale rufous. The markings which are not very strong are a pale line down each side of dorsum and along each lateral flange and a rather darker line down mid-dorsum and one half-way down "slope" outlined paler below. There are paler markings at anterior extremity.

The clothing of hairs, lenticles, etc., in the 1st instar conforms closely to the ordinary arrangement of these structures in the Plebeiids; comparing Figs. 18 and 19 with those of *P. icarus* and *A. thersites*, for example, in Plates XXXVII and XXXVIII, Trans. Ent. Soc. 1914, a little difference in the outline of the prothoracic plate appears, but the only marked difference is in the two hairs above the spiracles (III ?). In *icarus* and *thersites* the hair points or bases are present, but any hairs are very minute or evanescent, in *eros* the anterior of these has a hair about 0·075 mm. long, longer on 6th abdominal segment and on 7th 0·15 mm. long, quite comparable with the hairs of tubercle I which are 0·2 to 0·225 mm. long. The posterior of these two tubercles (III ?) has a minute hair about 0·02 to 0·025 mm. long.

In the 2nd instar the disposition of hairs and lenticles is very similar, though there is some little difference in the boldness of the hairs.

The larvae hibernate in the 3rd instar; no exception to this was observed, their appearance at this stage is well shown in Figs. 1 to 4. At this stage they contrast with the larvae of *P. icarus* and *A. thersites* in being much browner, hardly to be called green at all, the tone of the majority being that shown in Fig. 4.

The armament in this stage is apparently of much the same character as in *icarus*, *thersites*, etc., though the strength of tubercle III is still shown by there being two moderately long hairs at this position, the other species having only one.

My 1913 notes say—

February 8.—Brought a larva from refrigerator into warm room.

February 11.—Larva began to move, and being put on leaf of *Oxytropis campestris* began to eat.

February 12.—Has mined out a portion of leaflet and made some half-dozen small pellets of frass.

February 14.—Continues eating; has attacked 5 or 6 leaflets (still small), hardly looks any larger.

February 16.—Still eating, looks decidedly larger.

February 19.—Gave a fresh bit of leaf yesterday; has attacked two leaflets. Brought rest of larvae to warm room.

None of these larvae reached the 4th instar.

In 1914 it appears that about January 22nd I brought up some larvae and put them on a growing plant of *Oxytropis campestris*, they disappeared, but on February 1st one shows itself.

February 3.—Two larvae are obviously feeding, 3 are altogether in evidence.

February 9.—There are now five larvae in evidence, three of those noted above and 2 on a plant that was left out of doors all winter till 5 days ago. There are still a few larvae apparently alive in "cold storage."

February 19.—Larvae have been brought up and put on growing plants of *O. campestris* at various times in the last fortnight or so. Only a few survive.

One in the 4th instar (moulted since brought up), is when contracted 3·5 mm., probably 4·0 or over if moving. It is dull green, which has a rather dirty tint owing to the numerous black hair bases. There is a yellow tint down each side of the dorsum. The whole larva has a rough look owing to the comparatively long hairs, especially those on the dorsal and lateral ridges, which are of somewhat smoky tint. They are 0·4 or even 0·5 mm. long.

March 8.—A larva (No. 1 in 4th instar) 5·5 mm. long, very difficult to detect as it rests beneath a leaflet of *O. campestris*, its green being of much the same shade as that of the plant, and though it is covered with the minute black dots of the hair bases these merely help to give an effect of shadow, not otherwise very strong as both the leaflets and the larva are quite translucent, even in a moderate light. The hairs, which are longer and more abundant than in other Lycaenid larvae I know, merge very well with those of the plant, though the latter are colourless and those of the larva have a distinct brownish shade.

This larva is now quite green, with a brownish tinge on the prothoracic plate. Looked at in front the dorsal and lateral hairs make a very strong appearance, the hairs are quite 0·4 mm. long, there is a series of hairs of about half the length and fewer in numbers half-way up the slope. The larva is by no means fully grown in its present

instar, judging from the density of the hairs and the hollowness of the slope, though no doubt the abundant dorsal and lateral hairs make the flanges seem higher and consequently the hollow of the slope greater than they are in reality. There is a faint indication of a possible pale lateral line, and less so of a dorsal one.

It still feeds by mining, by means of its long neck, between the two cuticles of the leaves.

A larva (No. 2) 4·5 mm. long, possibly in same instar as No. 1, is much the same, except that it is of a yellowish or brownish tint overlying the green, as though the skin colour was dominant over the green colour of tissue or fluid beneath; it has no indication of dorsal or lateral line, the hairs seem rather darker and are certainly not quite so long, suggesting it is really in an earlier instar.

Larva No. 3 is still smaller and apparently laid up for moult; these are all the larvae of *eros* that now remain; they are remarkable as compared with *A. thersites*, being at the stages above indicated, whilst *thersites* brought out of cold at same date are now emerging as imagines.

Their small numbers prevents one treating them with any disrespect for examination, etc.

March 17.—A larva of *P. eros* apparently full-grown in 4th instar eats half thickness of leaf or even sometimes whole thickness, but these leaves are small, thin and succulent (forced).

When walking it is just over 5 mm. long, 2 mm. broad, 1·6 mm. high, of a dull green colour (decidedly a clearer brighter green than *thersitis* or *icarus* at this stage), hair bases of long hairs in flanges and some at middle of slope black, faint yellow lateral line indicated, dark dorsal line (vessel), paler along dorsal flanges and of oblique lines along slope rather imagined than seen. The smaller hairs have also dark bases, but less dark than those of the larger basis, or being so much smaller seem to be so. The honey-gland is surrounded by comparatively few lenticles, etc. The long hairs are quite 0·5 mm. long, of a faint brown tinge, quite conspicuously brownish taken together.

March 20.—The yellow lateral line is now quite distinct, almost bright, it is wanting in the other specimen.

March 26.—The larvae have been eating up to date, but seem to-day to be settling down for moult.

March 31.—One larva has moulted this morning.

April 1.—Has commenced to eat after some 6 days' fast.

April 2.—No. 2 has not yet changed. No. 1 is eating very deliberately, he eats the whole thickness of the leaflet (which is however much slighter than the strong leaves found on the plant in summer).

At rest it is about 5·5 mm. long, 2·3 mm. broad at 1st abdominal, narrowing just appreciably to 7th abdominal and then rapidly to the rounded posterior extremity. The colour is a rather dark apple green, faintly paler, but not approaching yellow along the dorsal ridges. The hair bases are numerous and rather dark, but too small to produce much colour effect except along the dorsal and lateral ridges. The spiracles are conspicuous, brown, the prothoracic plate is dark and so very visible. The lateral flanges stand out as very definite "flanges," as they probably do not do when the larva is full fed.

The dorsal and lateral hairs look strong and stiff, dark, brown rather than black, 6 or 8 on each eminence, longest about 0·5 mm. long. The honey-gland is obvious but not conspicuous. The fans are rather conspicuous white spots, they have been seen partially everted and then are very conspicuous.

No. 1.—Died April 3rd.

No. 2.—On April 9th had not changed, remained lethargic till yesterday it eat a little; it has one or two ominous black spots.

It was dead a day or two later.

My efforts to rear the larva from the egg having thus failed, the only available resource was to find the larvae at home in the spring, and so, finding I could manage to do so, on the 23rd May 1914, I went to Le Lautaret. The 21st and 22nd had been very fine, warm days, the 23rd looked doubtful, but for three hours in the afternoon I found it warm in the sun, although there was a strong wind, at the locality (7000 odd ft.) where *Oxytropis campestris* was most abundant. The first plant I looked at was one of sainfoin, and on this I found a larva of *A. thersites* conspicuous about the centre of the plant, leaves $2\frac{1}{2}$ to 3 inches long. The few further plants of *Onobrychis* I looked at did not afford another. On *Oxytropis* I found four larvae all rather small, so small that one could not be sure what they were. The 24th it rained all day. On the morning of the 25th, in a rather cold wind, I again looked for larvae in the same locality, and found 8 or 10, again rather small, on *Oxytropis*.

None of the larvae taken on *Oxytropis* seemed to be *thersites*, but whether they were *icarus* or *eros* or both was quite impossible to say. They were found generally beneath the leaf petioles, usually, however, after having dropped from these amongst rubbish below. One was found by searching, after first detecting its cast skin. Two other cast skins were found, but the corresponding larvae could not be found; the larvae when so small no doubt were easily lost by falling amongst the rubbish below the plants, one was found on a stone beneath a plant. The larvae were nearly all very small, apparently recently moulted into the 4th instar.

They eat the interior of the folioles through a small aperture, like the work of a *Coleophora*, of which also a pistol-shaped case was noticed. Small larvae of *Heterogynis* to the number of a dozen or two were seen on the *Oxytropis*, generally very obvious and exposed towards the ends and uppersides of the leaves.

As they grew these larvae in the 4th instar varied but little from each other, but were so like *icarus* at this stage (I had no living larvae of *icarus* by me for comparison, and had to trust to memory) that I felt quite uncertain whether all were *icarus*, all *eros*, or a mixture of both, they were certainly not *thersites*. These three species all flew at the locality where I found the larvae in fairly equal numbers. Their general appearance is well shown in Figs. 5, 6 and 7.

The same doubt continued when the larvae reached the last (5th) instar, indeed it became intensified by certain peculiarities.

A note made on June 7th shows that one larva out of 6 that were doing well seemed larger and of much brighter colour than the others. Had I one larva of one species and five of another?

Of the supposed (or hoped-for) *eros* 5 seem nearly full grown, one of them looks younger than the others but is larger, *i. e.* it is flatter and wider and more active, eating freely, the others are perhaps only sulky but are short, round and bunched.

No. 1 is 12 mm. long, has a bright yellow dorsal and lateral line, the latter very narrow and defined, but bright enough to make the lateral hairs look yellow, when seen through them. The dorsal line seems to diverge a little on each segment, *i. e.* the distance is

greater between them at the posterior than at the anterior border of the segments, they cease abruptly with the 6th abdominal segment. There are two faint oblique yellow lines on each slope, and a third less plain at the spiracle, equidistant from each other. The lateral flange hairs are faintly brown, most of the dorsal blackish. The hair bases are dark but not black and rather inconspicuous. The ground-colour is a pale almost yellowish grass-green. (Figs. 8 and 9.)

June 7, 1914.—The other 4, or 3 at least, are smaller, 10–11 mm., much darker green, the yellow lines much the same in position, etc., but dim and obscure, instead of bright and prominent. The yellow lines on slopes just visible and only in some lights. All hairs darker than in the first larva; supra spiracular row of hairs similar to those of the other except that they are more conspicuous in last segments. (Figs. 10, 11, 12.)

June 25th.—Of the above 5 larvae all duly pupated, together with one other (the sixth), between the 15th and 20th inst.

A special note of the variation in the larvae was taken when the question as to whether they were all of one species was in doubt.

June 11, 1914.—(1) A larva about full grown with very brilliant narrow yellow lateral line, dorsal line, only a rather yellower green than grass-green ground-colour, oblique lines even less clear, long hairs all rather dark, one or two nearly black on middle of slope, each segment.

(2) A similar larva, but hairs nearly colourless and dorsal yellow lines rather more distinct.

(3) Three smaller larvae with lines more distinct, one with ground-colour almost a yellowish green.

(4) A smaller larva (in 4th instar) has rather darker ground-colour and proportionally rather darker and longer hairs. ? is this the only *eros* ?

(5) A larva like 1st, but dorsal line on 1, 2, 3 and 4 abdominal is wanting on right side.

The remainder were decidedly smaller and rather more uniform in tint, and fed very slowly. Were these smaller larvae *eros* and the first six something else, *icarus* probably ? These smaller larvae are represented by Fig. 13.

In the event, there could be no doubt that all my larvae were *eros*, and that I had found no larvae but *eros* on the

Oxytropis campestris, the differences in the first six were mere variations in the larva, and the remainder differed owing to their being parasitised.

It follows, by the way, that *P. icarus* in the locality at Le Lautaret where I got these larvae does not affect *Oxytropis campestris*, there are there plenty of other *Papilionaceae* for it, including its favourite *Lotus corniculatus*. The six or eight larvae that proved to be parasitised "never grew larger, and at about half the size (bulk, not length) of the others retreated downwards into any available narrow space and then took a cylindrical form, became fastened by a little effusion from the mouth and dried up into a brown cyclinder, in which state they remain, and are almost certainly the hosts of some ichneumon, size 7·5 to 9·0 mm. long, 2·5 to 2·8 mm. wide in different specimens. The fastening by the head makes one suppose it is the tail end till specimens are more closely inspected."

The following notes made on the pupae of *eros* when it was supposed more than one species might be represented in my material, with a view to finding some distinctions between the (supposed) species, will serve to show the extent of variation in the pupae of *P. eros*.

June 20.—No. 1, the largest and most striped (oblique) larva, has a very transparent pupa, faintly greenish, 11 mm. long, wings very glassy, showing tracheae; there are a good many *very* short hairs over head and prothorax. There is a waist (seen laterally) about 3·5 mm. high, prothorax and 3rd abdominal about 3·8.

June 26.—Wings are now satiny white, eyes brownish and whole pupa more solid looking.

June 20.—Pupa of larvae 2 and 3, extremely like No. 1 as to colour, transparency, etc., hairs rather more obvious especially along abdomen, where they can hardly be seen in No. 1. They are also a little smaller, 10·5 mm. long, but about same height. Larval skin covers last segments in both. No. 1 is nearly free, this one has a "girth" consisting of several threads on each side arising from position of lateral pad, but taking separate directions—one over prothorax, one over 1st abdominal and one going right back to 6th abdominal segment; there are also a few oblique and one or two longitudinal threads, uniting these several strands, so that though the structure hardly exists still it seems as much entitled to be called a cocoon as a girth. The larval skin is quite free from any

pad or other spinning. Another specimen is quite free like No. 1, and seems also less hairy.

No. 4 is also free, No. 5 has some spinning and has abdominal hairs, No. 6 is free.

June 26.—Nos. 2–5 are showing thickening of wings and darkening of eyes, No. 6 less so.

June 27.—A parasite emerged from a brown (dead?) larva.

June 28.—Another parasite emerged.

It is to be noted that the pupae (healthy) were formed some days before the stung larvae dried up, but the parasites are emerging whilst the pupae have still some days to go. (They have now brown eyes and opaque wings.)

June 28.—These pupae show the fore-wings, with a wide vacant margin behind them (occupied by hind-wings??), and the wings have a broad margin beyond where the nervures reach to.

June 30.—1st specimen (No. 3) emerged, *eros* ♂.

Five of the parasites have emerged, 2 remain unemerged.

July 1.—2 ♂ and 2 ♀ emerged. No. 1 ♂, 2 ♀, 4 ♀, 5 ♀. They emerge between half-past 7 and 8. They leave no meconium in the pupa case.

It thus appears that all my larvae were *eros*, and that there were amongst them no *icarus*.

July 3.—The last imago (No. 6) emerged—a ♀. Another parasite.

The latter (in pupa) was isolated, and the observation was thereby verified that though the hole of emergence, on the back of the last segments of the dry and hard larva skin, has the appearance of a lid having been cut out leaving a round hole, there is in fact no such lid and the hole is made by gnawing away the material. There is no lid discoverable, but a fair amount of frass-like material lying about the hole, the chips or sawdust resulting from the gnawing up of the stuff removed to make the opening.

July 4.—7th and last *Rhogas bicolor* emerged.

I sent some of the parasites reared from *P. eros* to Mr. C. Morley, who writes me that I send him "*Rhogas bicolor*, Spin. It is a common Braconid (not Ichneumonid) from Italy to England and Scotland, also taken by me in Mayo. It is said to have been bred from *Zygaena filipendulae* and *Leioptilus tephradactylus*, Hubn., only."

Explanation of Plates.

Plate LXIX, fig. 1, *P. eros*, larva in third (hibernating) stage natural size.

Figs. 2, 3, 4. Three figures of third stage larvae enlarged, the brownish coloration of figs. 3 and 4 is especially characteristic of *P. eros* in this stage, in comparison with the same stage larvae of *P. icarus* and *A. thersites*, which I was rearing at same time and so could compare them.

Figs. 5, 6, 7. Fourth stage larvae (after 1st spring moult) much enlarged.

Plate LXX, figs. 8–13, last stage (5th instar) larvae, much enlarged (about × 5).

Figs. 8 and 9 from the large well-coloured and well-marked larva.

Figs. 10, 11, 12. From duller and more uniformly coloured larvae.

Fig. 13, one of the larvae that ceased growing early and appeared to be full-grown whilst still much smaller than those figured 8–12. These larvae being all collected, there was some doubt whether some of these might be *icarus* or some other species, however 8–12 all proved to be *eros*, those represented by fig.13 were all ichneumoned and were also doubtless *eros*, so that all the larvae found on *Oxytropis campestris* were *eros*.

These figures, as reproduced, do not do full justice to Mr. Knight's drawings. They fail especially in making the eminences of the dorsal flange on each segment smoothly rounded instead of somewhat angular, in making the eminences of the lateral flanges similarly rounded instead of flattened except just at the incisions, and in giving in some cases an appearance of smoothness contrary to the rough surface due to the hairs and hair-bases. They do nevertheless give a very good idea of the colour and general aspect of the larvae.

Plate LXXI, fig. 14. Eggshells of *P. eros** × 40.

Plate LXXII, figs. 15, 16, 17. Three examples of the micropyle of the egg of *P. eros* × 350.

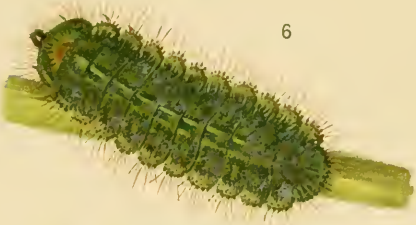
Plate LXXIII, fig. 18. Skin of first stage larva × 80.

* Selected as least injured by larvae in hatching.

1

5

2



6

3

7

4

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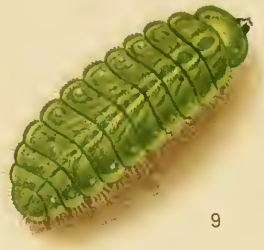
LARVAE OF P. EROS.

8



9

10

11

12

13

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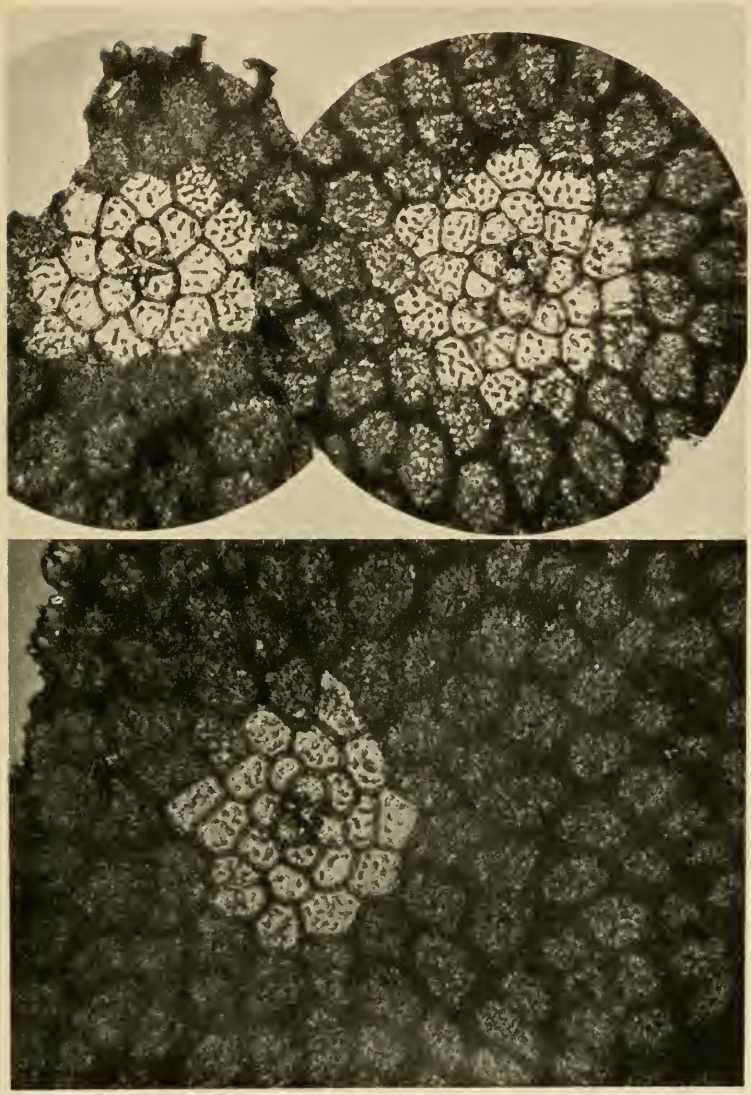
LARVAE OF P. EROS.

Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIG. 14.

P. EROS, EGGSHELLS × 40.



Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIGS. 15, 16, 17.

P. EROS, THREE EXAMPLES OF MICROPYLE × 350.

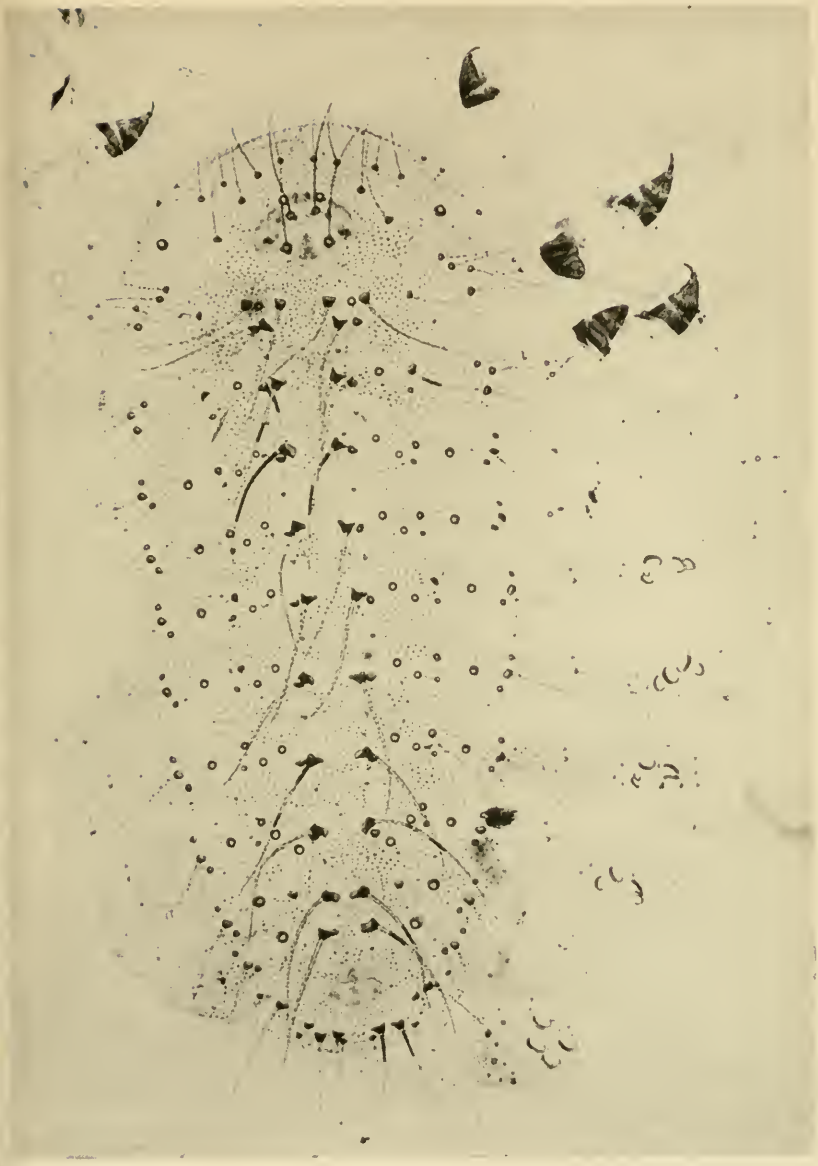


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FIG. 18.

P. EROS, SKIN, FIRST STAGE LARVA × 80

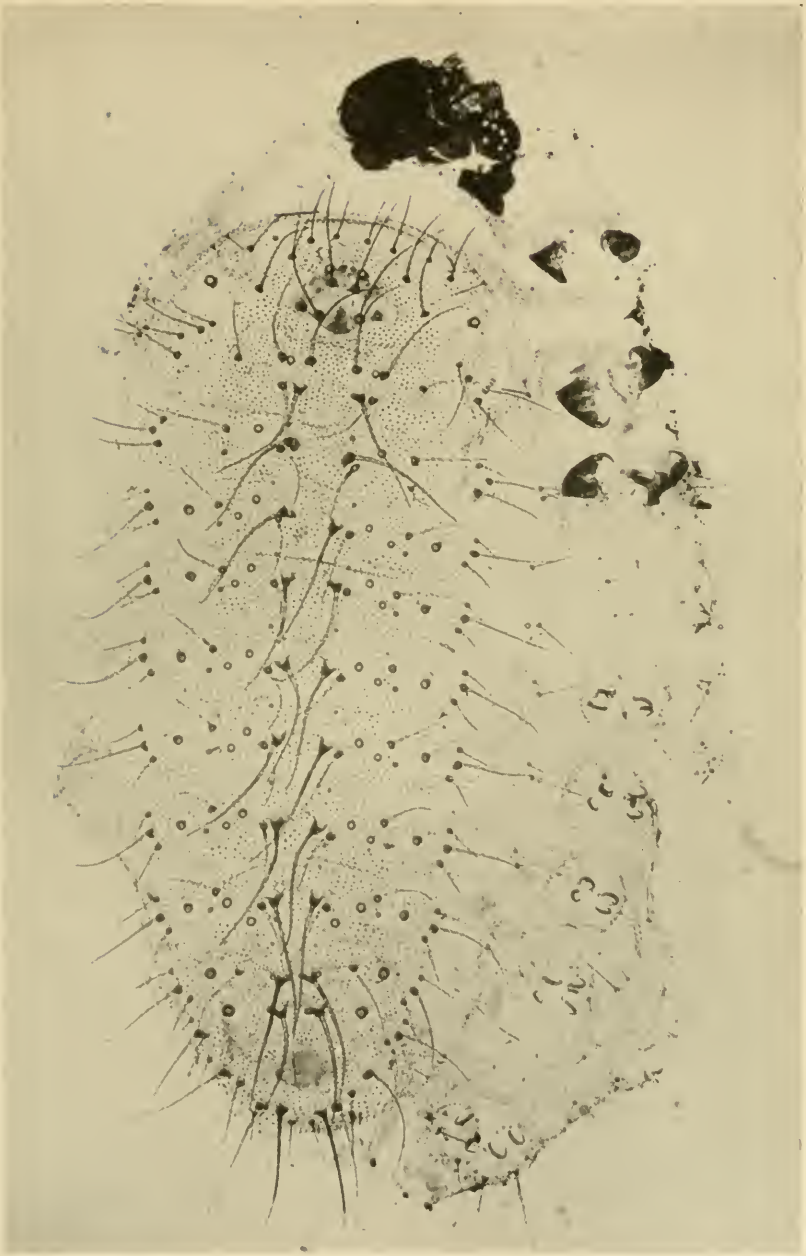

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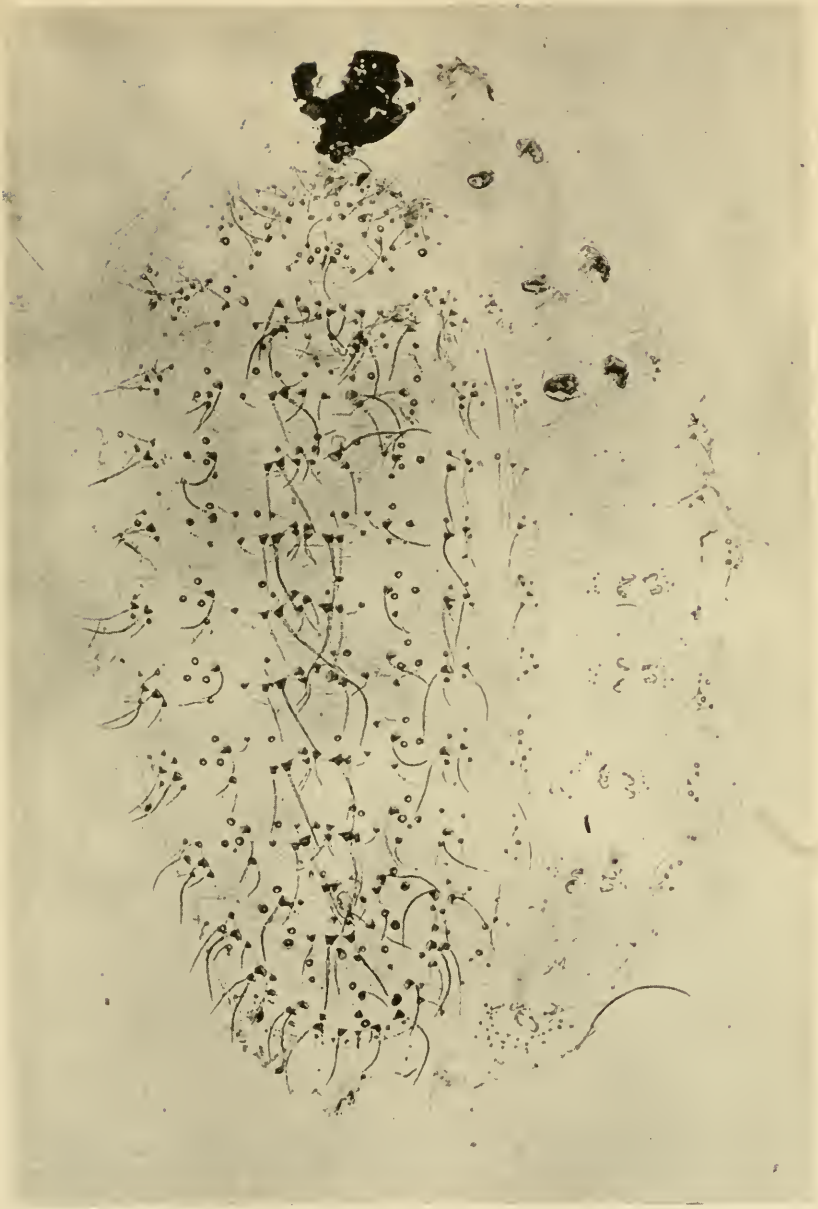
FIG. 19.

P. EROS, SKIN, FIRST STAGE LARVA × 80.



Photo, F. N. Clark. *Engravers Guild, Ltd.*

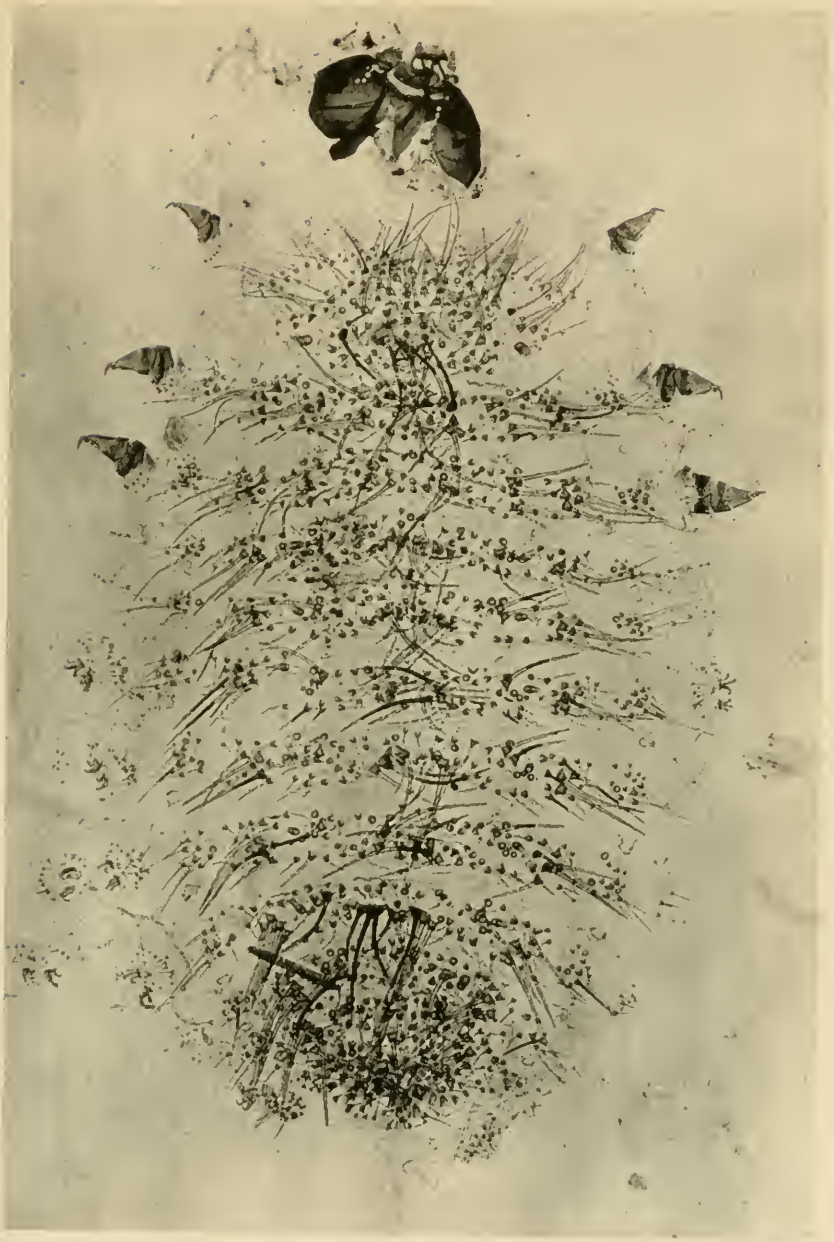
FIG. 20.

P. EROS, SKIN, SECOND STAGE LARVA × 40.

Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIG. 21.

P. EROS, SKIN, SECOND STAGE LARVA × 40.



Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIG. 22.

P. EROS, SKIN, THIRD STAGE LARVA × 36.

Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIGS. 23, 24.

P. EROS, SKIN, FOURTH STAGE LARVA, PROTHORACIC PLATE × 100. LAST SEGMENTS × 35.

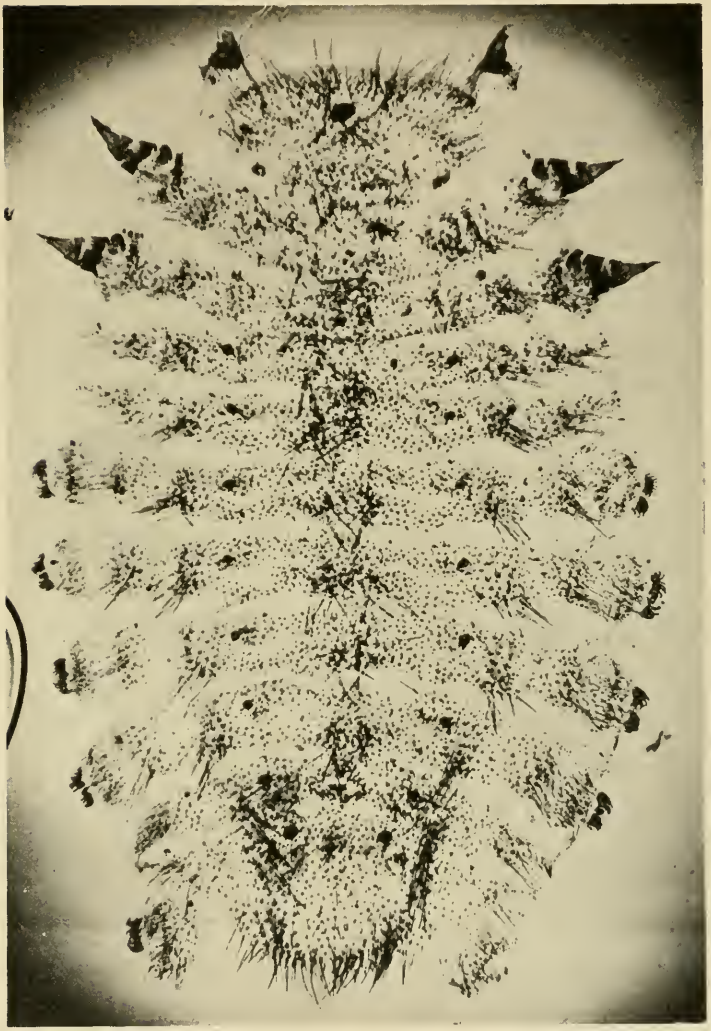


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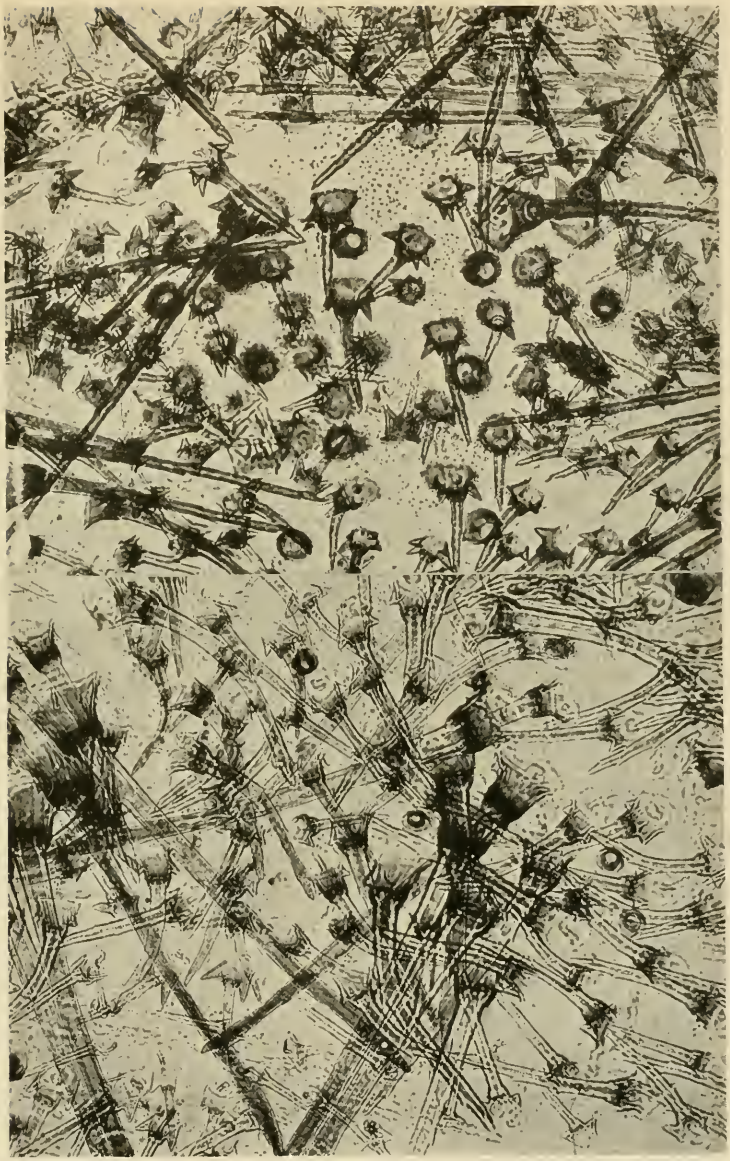
FIG. 25.

P. EROS, SKIN, LAST STAGE LARVA × 15.



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FIGS. 26, 27.

P. EROS, PROTHORACIC PLATE AND A DORSAL AREA, LAST LARVAL INSTAR × 100.

Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIGS. 28, 29.

P. EROS, LAST LARVAL INSTAR, HONEY-GLAND REGIONS × 35. PROLEG × 100.

Photo, F. N. Clark. *Engravers Guild, Ltd.*

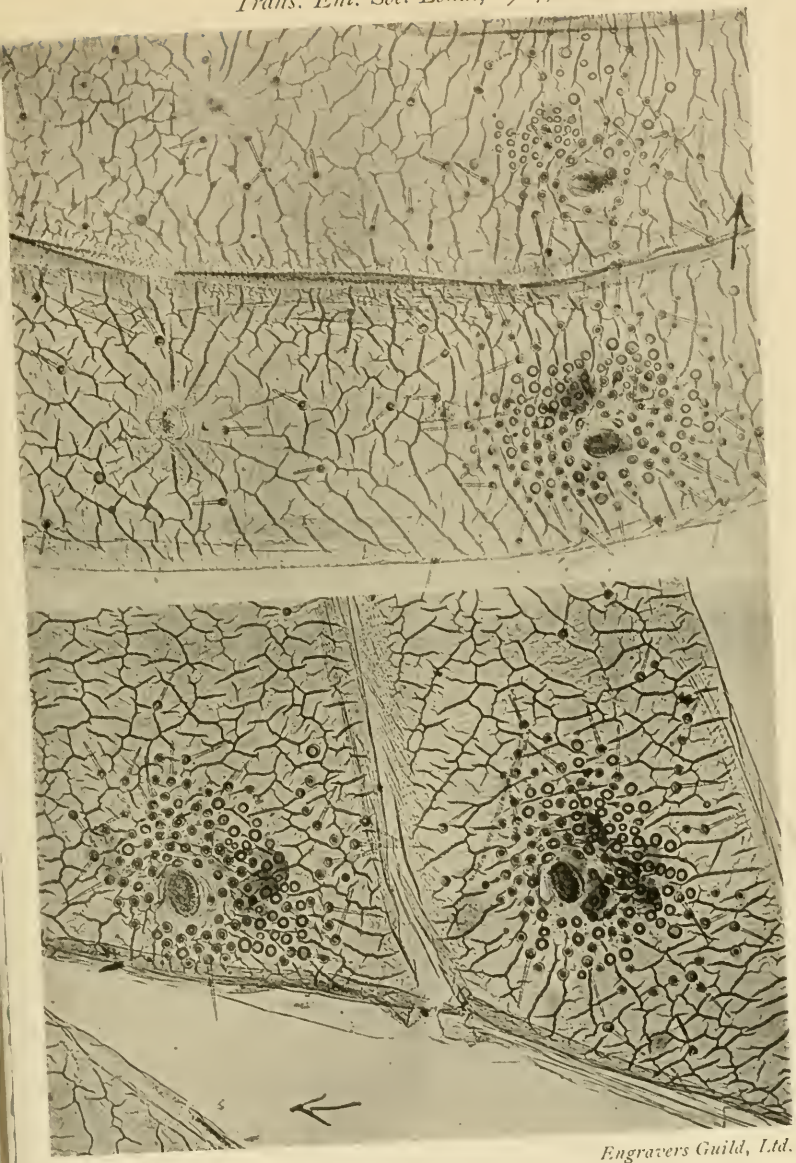
FIGS. 30. 31.

P. EROS, PUPA, PROTHORAX AND METATHORAX × 25

Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIGS. 32, 33.

P. EROS, PUPA, HEAD AND CREMASTRAL REGION × 25.



Photo, F. N. Clark. *Engravers Guild, Ltd.*

FIGS. 34, 35.

P. EROS, SPIRACULAR REGIONS OF PUPA × 35.

Plate LXXIV, fig. 19. Another example.
Plate LXXV, fig. 20. Skin of second stage larva × 40.
Plate LXXVI, fig. 21. Another example.
Plate LXXVII, fig. 22. Skin of third stage larva × 36.
Plate LXXVIII. Skin of fourth stage larva.
Fig. 23. Prothorax × 100.
Fig. 24. Last segments × 35.
Plate LXXIX, fig. 25. Skin of fifth (last) stage larva × 15.
Plate LXXX, fig. 26, prothorax × 100.
Fig. 27. Dorsal hairs ×100.
Plate LXXXI, fig. 28. Honey-gland region of last stage larva × 35.
Fig. 29. Proleg of same × 100.
Plate LXXXII. Pupa skin.
Fig. 30. Prothorax with dorsal head-piece × 25.
Fig. 31. Metathorax × 25.
Plate LXXXIII, fig. 32. Head × 25.
Fig. 33. Cremastral area × 25.
Plate LXXXIV. Spiracular region of pupa.
Fig. 34, 4th and 5th spiracles × 50.
Figs. 35, 2nd and 3rd spiracles × 50.
Arrows point towards head.

XVII. *A Contribution to the Life-History of* Plebeius zephyrus *var.* lycidas. By T. A. Chapman, M.D., F.Z.S.

[Read November 4th, 1914.]

Plates LXXXV–XC.

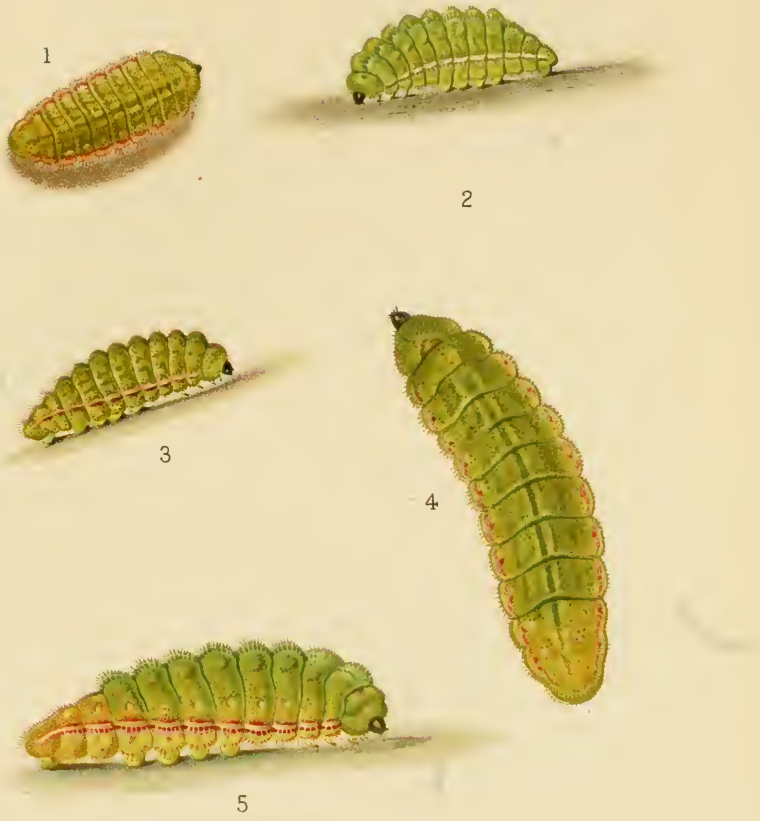
On the 28th April 1914 I went to the locality near the 2nd Refuge on the Simplon route where *Plebeius lycidas* is found, my object being to find, if possible, larvae of *Agriades escheri*. Searching the plants of *Astragalus exscapus* I found about a dozen larvae of *P. lycidas* and two which I hoped might prove to be *A. escheri*. Of the larvae of *lycidas*, two were nearly full-grown, the others mostly small; they were always well hidden near the centre of the plant, the only indication of their presence was sometimes a white apex to some of the leaflets of a few leaves where the green material had been eaten away and the cuticle left when the leaf was smaller.

Their habits in captivity were to burrow deeply into the central mass of leaves and flower buds, sometimes almost going out of sight, but leaving a heap of frass beside the hind segments that remained visible. Their colour and markings were so very similar to those of the plant, when viewed together in this relationship, that I several times overlooked a larva, till I returned to a root stock again and more carefully examined it, because a larva was not accounted for.

The habits of *A. escheri* (?) in burrowing into the central mass was very similar to that of *lycidas*. It may perhaps be desirable to explain that the plant *A. exscapus* bears a mass of flowers entirely sessile on the top of the root stock, and that, at the season these larvae were feeding, the flower-buds and young leaves made a somewhat solid mass in the middle of the plant.

The larvae seemed to be making for, and usually reached, not the interior of the flower buds, but the growing stem-material and young budding tissue just below them.

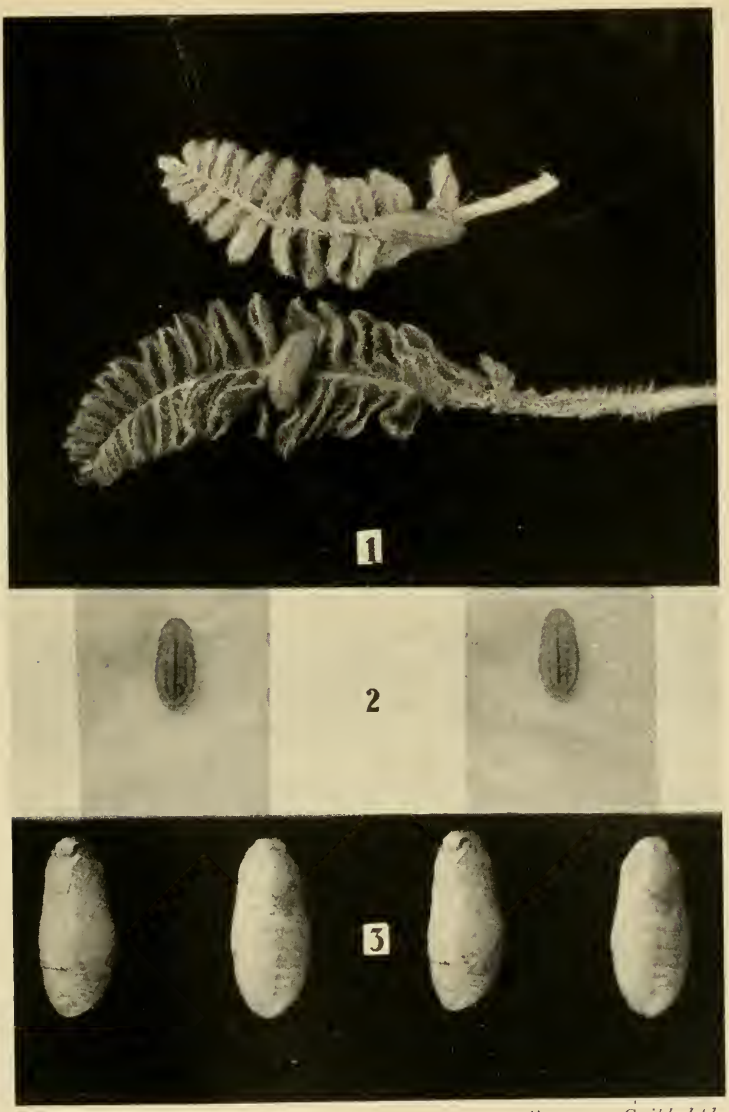
A description of the larva is unnecessary in view of Mr. Knight's excellent drawings, and the photographs showing the structure of the clothing of hairs.



E.C. Knight del.

West, Newman chr.

LARVAE OF PLEBEIUS ZEPHYRUS *var* LYCIDAS.



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P. LYCIDAS, LARVA AND PUPA.

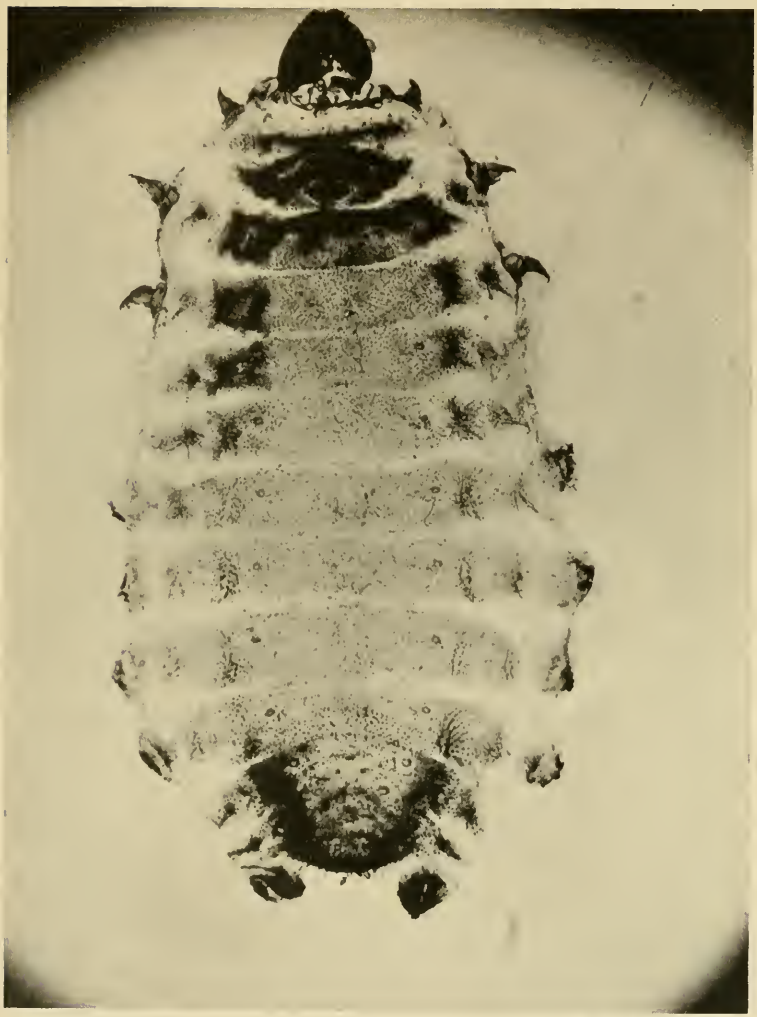

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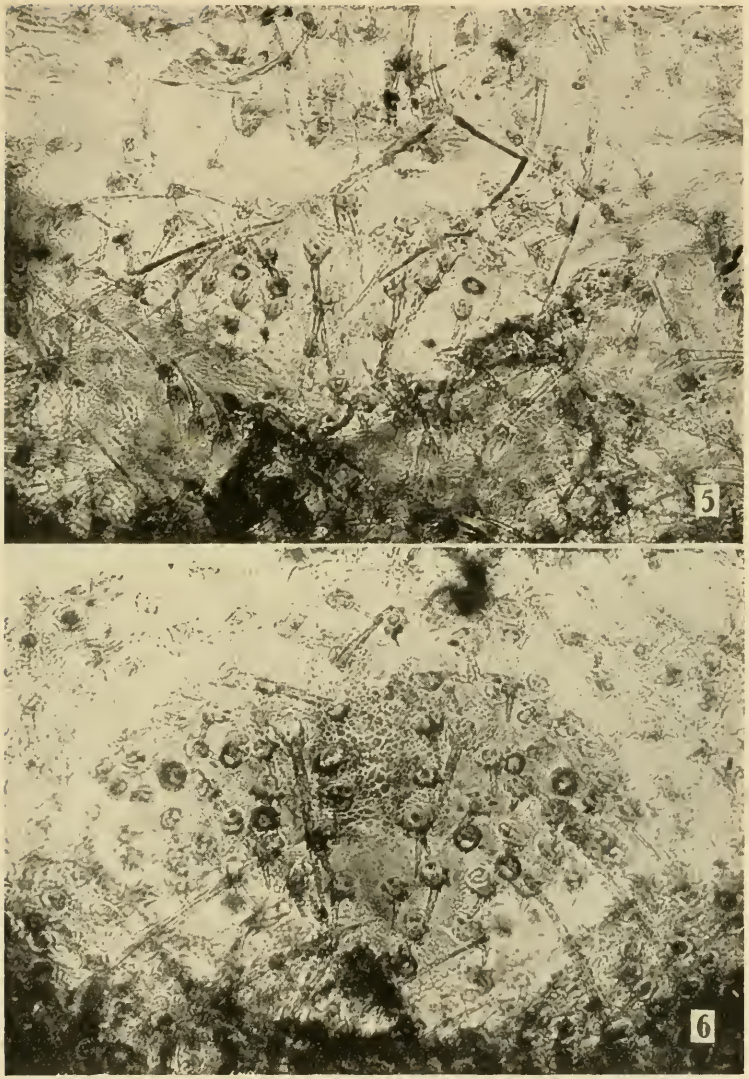
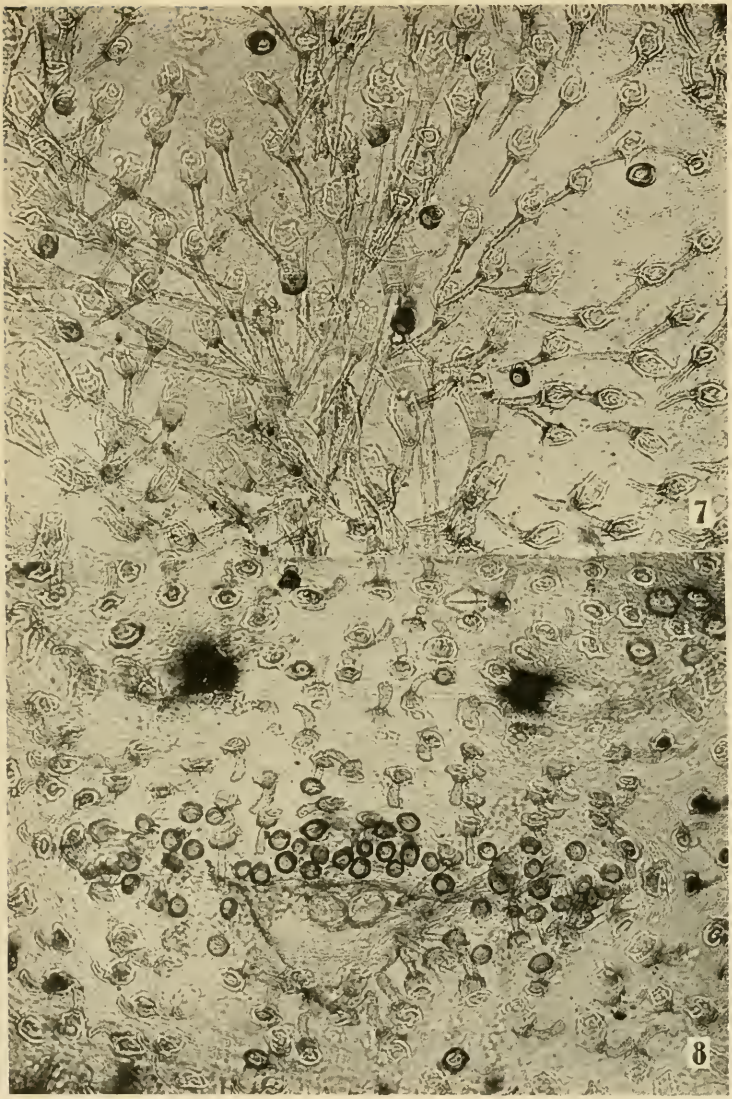
FIG. 4.

P. LYCIDAS, SKIN, LAST STAGE LARVA × 9.



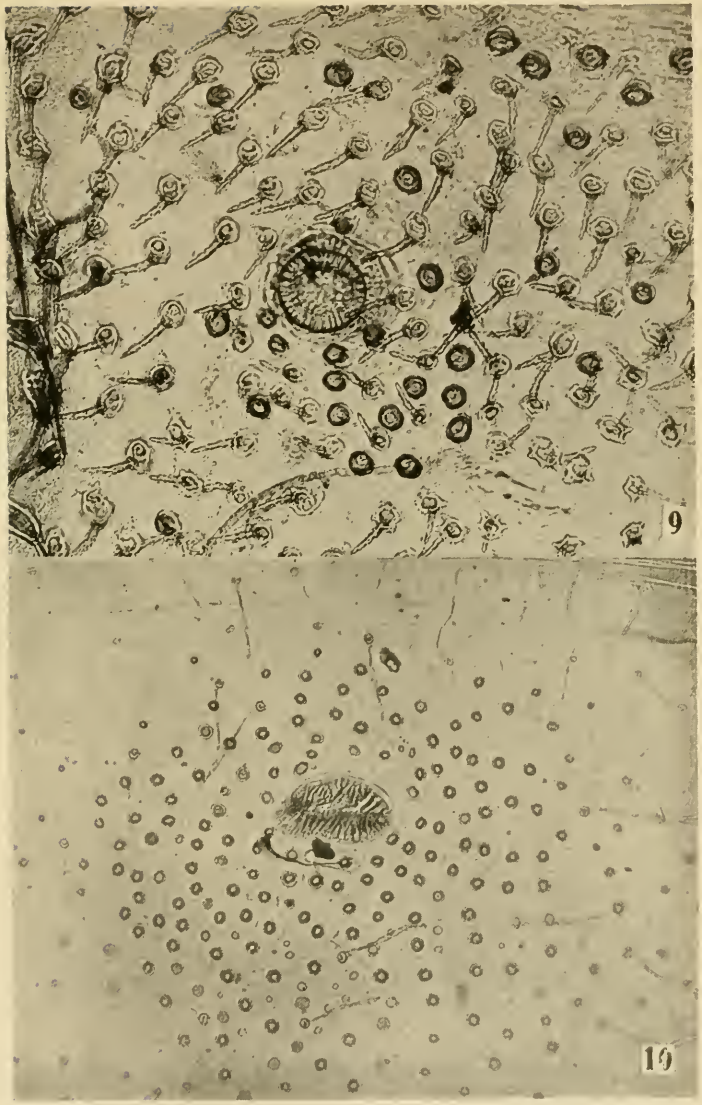
Photo, F. N. Clark. *Engravers Guild, Ltd.*

P. LYCIDAS, PROTHORACIC PLATE, PENULTIMATE AND LAST LARVAL INSTAR × 100.



Photo, F. N. Clark. *Engravers Guild, Ltd.*

P. LYCIDAS, LAST STAGE LARVA, A DORSAL AND A HONEY-GLAND AREA × 100.



Photo, F. N. Clark. *Engravers Guild, Ltd.*

P. LYCIDAS, A SPIRACULAR AREA, LAST LARVAL AND PUPAL INSTARS × 100.

The larva is of much the usual Lycaenid form, but I was much struck by the appearance of the larva when viewed dorsally. In this aspect it seemed quite flat and drawn out, and very slug-like; this effect is very obvious in Mr. Knight's fig. 4, though fig. 5 shows that it really has a very ordinary thickness. The effect is probably the result of the coloration; this is very bright and distinct, but when the larva is on the plant and feeding by burrowing into it, it conceals it most effectively. I cannot say that the appearance of flatness is an element in producing this effect, as it is most conspicuous when the larva is brought out into the open and so into unnatural conditions.

Apart from the colouring, it may be noted that the larva has no very long hairs, the longest, very moderate, being along the lateral flange.

The pupa is of very delicate structure so far as a not very healthy specimen showed. Several pupae were obtained, but inability to supply the larvae with proper food and moving about with them resulted in no imago emerging.

This imperfect account of the larva seems worth presenting, as I am not aware of any figure or description of the larva having been so far published.

Explanation of Plates.

PLATE LXXXV.

Larvae of *P. zephyrus*, var. *lycidas*.

Figs. 1, 2 and 3. Larvae in penultimate instar.
4, 5. ,, ,, last instar. Much enlarged.

PLATE LXXXVI.

Fig. 1. Larvae of *P. lycidas* on leaves of *Astragalus exscapus*.
2. Larva of *P. lycidas*, nat. size. Stereoscopic.
3. Pupae of *P. lycidas*, × 2. Stereoscopic.
Photos. by Mr. H. Main.

PLATE LXXXVII.

4. Skin of larva of *P. lycidas*, × 9.

PLATE LXXXVIII.

Prothoracic plate of larva, × 100.

5. Penultimate instar.
6. Last instar.

PLATE LXXXIX.

7. Dorsal hairs of larva, last instar, × 100.
8. Honey-gland region, last instar, × 100.

PLATE XC.

9. Spiracular region of larva, last instar, × 100.
10. Spiracular region of pupa, × 100.

XVIII. *A revision of the species of the genus* Odynerus (Hymenoptera) *occurring in the Ethiopian Region.*

By Geoffrey Meade-Waldo, M.A.

(Published by permission of the Trustees of the British Museum.)

[Read October 7th, 1914.]

Plate XCI.

In the following paper an attempt has been made to bring together all the species of the cosmopolitan genus *Odynerus* known to occur in the Ethiopian Region. Species from Madagascar are not included. At the same time I have taken the opportunity of describing a number of new species and varieties.

The genus would seem to be richly represented throughout the whole continent, and the number of species must ultimately prove to be very considerable.

I have listed 132 species, and of these 24 are described as new; three new varieties of known species are also described.

Through the courtesy of various correspondents it has been possible to examine types or at least cotypes of a number of the species. For these facilities my thanks are specially due to the following: to Dr. Severin, of the Musée d'Histoire Naturelle, Brussels; to M. Lucien Berland of the Paris Museum; to Prof. Y. Sjöstedt of Stockholm and to Prof. E. B. Poulton, F.R.S., each of whom has most generously loaned me types or cotypes from their several institutions. All measurements of length (unless stated to the contrary) are taken from the front of the head to the apex of tergite 2. The types of all the new species are in the British Museum.

List of the known Species of *Odynerus* in the Ethiopian Region.

(* Types or cotypes have been examined of all species marked with an asterisk.)

Subgenus *Ancistrocerus*, Wesm.

*1. *massaicus*, Cam.
*2. *budongo*, sp. n.
*3. *lineaticollis*, Cam.
**lineaticollis*, var. *rufopictus*, var. nov.
*4. *maculiscapus*, Cam.
5. *striativentris*, Cam.
*6. *gowdeyanus*, M.-Waldo.
*7. *neavei*, sp. n.
8. *zebra*, Sauss.
9. *massanensis*, Sauss. (Plate XCI, fig. 1.)
*10. *lufirae*, sp. n.
11. *inconstans*, Sauss.
*12. *kibonotensis*, Cam.
*13. *neuvillei*, Du Buysson.

Species unknown to the author.

14. *heydenianus*, Sauss.

Subgenus *Lionotus*, Sauss.

Division A. Postscutellum truncate posteriorly.

Section 1. Postscutellum laterally tuberculate or subtuberculate.

Group of *O. mucronatus*, Saussure, scutellum armed.

1. *mucronatus*, Sauss.
*2. *katonai*, Schulthess.
*3. *bisellatus*, Schulthess. (Plate XCI, fig. 2.)
*4. *carinatus*, sp. n. (Plate XCI, fig. 7.)
*5. *quadrituberculatus*, Smith. (Plate XCI, fig. 3).
*6. *pulchripilosellus*, Cam.
*7. *conradsii*, Schulthess.
*8. *rikatlensis*, Schulthess.
9. *metatarsalis*, Schulthess.
*10. *hansi*, sp. n.
11. *senex*, Cam.
11a. *canaliculatus*, Sauss., described from Arabia, is in this group.

Group of *O. silaensis*, Saussure, scutellum flat.

*12. *rubroniger*, Bingh.
13. *cameroni*, Schultz (= *tegularis*, Cam. (nec Mor.).
*14. *kristenseni*, sp. n.
*15. *gambiensis*, sp. n.
*16. *silverlocki*, sp. n. (Plate XCI, fig. 4*a*, 4*b*.)
*17. *stiraspis*, Cam.
*18. *sjöstedti*, Cam.
*19. *pakasae*, sp. n.
·20. *whiteanus*, Cam.
*21. *dimorphus*, sp. n.
*22. *silaensis*, Sauss.
*23. *aşmarensis*, Schulthess.
24. *armatiscutis*, Cam.
*25. *arethusae*, sp. n.
*26. *signatus*, Smith.
27. *metemmensis*, Magr.
28. *defractus*, du Buyss.
*29. *ukerewensis*, Schulthess.
*30. *karibae*, sp. n.
31. *jocosus*, Gerst.
32. *vulneratus*, Sauss.
*33. *goniodes*, Schletterer. (Plate XCI, fig. 5.)
34. *pulchellus*, Gerst.
*35. *solstitialis*, Sauss.
*36. *fervidus*, Sauss. (Plate XCI, fig. 10.)
*37. *tropicalis*, Sauss.
38. *schönlandi*, Cam.
39. *acanthoaspis*, Cam.
40. *dunbrodyensis*, Cam.
41. *melanodontus*, Cam.

Section 2. Postscutellum laterally without tubercles.

42. *carinatulus*, Sauss.
*43. *rhynchoides*, Sauss. (= *saussurei*, E. André).
*44. *pseudolateralis*, sp. n.
*45. *tectus*, F.
*46. *meyeri*, Cam. and var. **albolimbatus*, Schulthess.
*47. *euryspilus*, Cam.
*48. *schultzeanus*, Schulthess.
*49. *vaalensis*, Cam.
*50. *deceptor*, sp. n.

Division B. Postscutellum curved posteriorly.

Section 1. Abdominal segments 1 and 2 without conspicuous lateral spots.

Group of *O. floricola*, Saussure.

*51. *cnemophilus*, Cam.
*52. *kilimandjaroensis*, Cam.
53. *hottentottus*, Sauss. (Plate XCI, fig. 8.)
54. *sesquicinctus*, Sauss.
*55. *capicola*, sp. n.
*56. *lateralis*, F.
*57. *lateralis*, F., var. *unicolor*, Schulthess.
*58. *lugubris*, sp. n.
*59. *combustus*, Smith.
*60. *curvirufolincatus*, Cam.
*61. *marginipunctatus*, sp. n. (Plate XCI, fig. 6.)
*62. *bothriogaster*, Schletterer.
*63. *aureosericeus*, sp. n.

Section 2. Abdominal segments 1 and 2 with conspicuous lateral spots.

Group of *O. aethiopicus*, Saussure. Clypeus apically emarginate.

*64. *stiraspis*, Cam.
*65. *scripticeps*, Cam. (Plate XCI, fig. 9.)
*66. *simplidentatus*, M.-Waldo.
*67. *stellaboschensis*, Cam.
68. *aethiopicus*, Sauss.
*69. 14-*maculatus*, Schulthess.
*70. *schulthessi*, sp.n. (Plate XCI, fig. 11.)
*71. *wellmani*, M.-Waldo.
*72. *aequinoctialis*, Sauss.
*73. *erythrotomus*, Cam.
*74. *meruensis*, Cam.
75. *falcatus*, Tullgr.

Group of *O. bellatulus*, Saussure. Clypeus apically truncate.

*76. *spoliatus*, Cam. (Plate XCI, fig. 12.)
*77. *indecorus*, Cam.
78. *mutabilis*, Sauss.
79. *bellatulus*, Sauss.
*80. *rotundiscutis*, Cam.
*81. *harrarensis*, sp. n.
*82. *sheffieldi*, sp. n.
83. *macrocephalus*, Grib.
84. *multicolor*, Sauss.
85. *mutans*, Sauss.

Species (subgen. *Lionotus*) unknown to the author.

86. *natalensis*, Sauss.
87. *meridionalis*, Sauss.
88. *o'neili*, Cam.
89. *kloofensis*, Cam.
90. *frendens*, Grib.
91. *troglodytes*, Sauss.
92. *determinatus*, Cam.
93. *penetratus*, Cam.
94. *angustus*, Sauss.
95. *caviventris*, Kirsch.
96. *guerini*, Sauss.
97. *hyacinthae*, Grib.
98. *interruptus*, Sauss.

Division C. Stenodynerus, Sauss.

*99. *corvus*, sp. n. (Plate XCI, fig. 15.)
100. *bairstowi*, Grib.
*101. *ferrugineus*, Schulthess. (Plate XCI, fig. 13.)
102. *politiclypeus*, Schulthess. (Plate XCI, fig. 14.)

Subgenus *Hoplomerus*, Westw.

*103. *spiniger*, Schulthess.
104. *spiniger*, Schulthess. var. *flavus*, nov.
*105. *simplex*, Bingh.
*106. *zebroides*, sp. n.
*107. *adonis*, sp. n.

Species (subgenus *Hoplomerus*) unknown to the author.

108. *quartinae*, Grib.
109. *senegalensis*, Sauss.
110. *rectus*, D. T.
111. *ferruginosus*, Sauss.

Species (*Odynerus*, sens. lat.) unknown to the author.

112. *humbei*, Rad.
113. *obscurus*, Rad.
114. *raffrayi*, Rad.
115. *emeryanus*, Grib.
116. *magrettii*, Grib.
117. *frendens*, Grib.
118. *dauensis*, Magretti.

Odynerus, Latr.

Key to the Subgenera dealt with in this Paper.

1. (2) First abdominal segment with at least one distinct transverse carina, sometimes with 2 carinae (div. *Epancistrocerus*); last joint of antennae (♂) bent back to form a hook. . . . . *Ancistrocerus*, Wesm.
2. (1) First abdominal segment without any carina; antennae (♂) as in *Ancistrocerus* or with the terminal joints rolled up in spiral fashion.
3. (4) Antennae (♂) as in subgenus *Ancistrocerus*.
   Lionotus, Sauss.
4. (3) Antennae (♂) with the terminal joints rolled up in spiral fashion, species (in Ethiopian fauna) large.
   Hoplomerus, Westwood (= *Hoplopus*, Sauss.).

Subgenus *Ancistrocerus*.

1. (4) Tergite 1 with 2 transverse carinae. . div. *Epancistrocerus*.
2. (3) Mesonotum and scutellum uniformly coarsely punctured; clypeus (♀) ferruginous. . . . . *massaicus*, Cam.
3. (2) Posterior half of mesonotum and scutellum shining, almost impunctate; clypeus (♀) yellow, black centrally.
   budongo, sp. n.
4. (1) Tergite 1 with 1 transverse carina.
   s. g. *Ancistrocerus*, sens. str.
5. (6) Head and thorax black, abdomen wholly ochraceous yellow, length 11½ mm. . . . . *gowdeyanus*, M.-Waldo.
6. (5) Head and thorax black, sometimes with yellow or ferruginous markings; abdomen black, with at least two yellow fasciae.
7. (12) Tergite 1 somewhat elongate, subpetiolate, resembling *Nortonia* species.

8. (9) Pronotum ferruginous, wings subfuscous, postscutellum black. . . . . *maculiscapus*, Cam.
9. (8) Pronotum black, narrowly yellow along the anterior margin, postscutellum with a transverse yellow line; clypeus (♀) with considerable pale markings.
10. (11) Sides of pronotum parallel, wings fuscous. *kibonotensis*, Cam.
11. (10) Sides of pronotum rounded, wings clear hyaline.
12. (7) Tergite 1 not elongate, at least as broad apically as long.
13. (14) Colours yellow and ferruginous red, lateral angles of median segment very sharp. . . . . *inconstans*, Sauss.
14. (13) Colours black, with yellow markings and fasciae.
15. (16) Segments 1 and 2 of abdomen with yellow apical fasciae, median segment without lateral angles; wings very ample. . . . . *neavei*, sp. n.
16. (15) Segments 1–4 with yellow or yellowish white apical fasciae.
17. (20) Small species. Total length 8 mm.
18. (19) Tergite 2 tuberculiform at base; tegulae and a line on scutellum yellow. . . . . *massanensis*, Sauss.
19. (18) Tergite 2 normally rounded above; tegulae ferruginous, no yellow on scutellum. . . . . *lufirae*, sp. n.
20. (17) Larger species. Total length 11–13 mm.
21. (24) Tegulae ferruginous, legs for the most part ferruginous; anterior margin of pronotum with a narrow yellow fascia.
22. (23) Wings fuscous, scutellum black, head and thorax with a long pubescence. . . . . *lineaticollis*, Cam.
scutellum ferruginous . . . . var. *rufopictus*, nov.
23. (22) Wings partly fuscous, scutellum with an interrupted yellow line. . . . . *neuvillei*, du Buyss.
24. (21) Tegulae black, legs mostly black.
25. (26) Head and thorax clothed with a long dark pubescence. *striativentris*, Cam.
26. (25) Head and thorax clothed with cinereous pubescence. *zebra*, Sauss.

Subgenus *Lionotus*.

1. (67) Postscutellum truncate, laterally tuberculate or subtuberculate; group of *O. dubius*, etc.
2. (19) Scutellum bilobed or laterally lamellate (schaüfelformig) or tuberculate.
3. (8) Tegulae very large.
4. (5) Scutellum with lateral lamellae; colours black, ferruginous and yellow. . . . . *mucronatus*, Sauss.

5. (4) Scutellum with lateral tubercles.
6. (7) Colours black; abdominal segments 1–4 with pale yellow apical fasciae, tegulae black or red and yellowish white. *katonai*, Schulthess.
7. (6) Colours ferruginous-red, abdomen with pale yellow fasciae, tergite 2 with a short yellow longitudinal line; tegulae ferruginous. . . . . *bisellatus*, Schulthess.
8. (3) Tegulae normal.
   (*O. canaliculatus*, Sauss., comes in here.)
9. (12) Tergite 2 with a distinct tubercle or longitudinal carina.
10. (11) Clypeus with 2 prominent longitudinal carinae, tergite 2 with a longitudinal carina; mesonotum with very coarse longitudinal striation; prothorax mostly black. *carinatus*, sp. n.
11. (10) Clypeus without carinae, tergite 2 with blunt tubercle near base; prothorax mostly ferruginous. *quadrituberculatus*, Smith.
12. (9) Tergite 2 normal, no carina or tubercle; colours mostly ferruginous. Pronotum with anterior margin yellow, tegulae mostly yellow, pubescence silvery. *pulchripilosellus*, Cam.
13. (14) Head and thorax mostly with ferruginous markings; abdomen with narrow apical fasciae on tergites 1–4 (♀), 1–7 (♂); clypeus broader than long. Small species 4½–5½ mm. . . . . *conradsii*, Schulthess.
14. (13) Medium-sized species 7–8 mm.
15. (18) Sides of median segment almost impunctate.
16. (17) Ferruginous; postscutellum, post-tegulae and apical fasciae on tergites pale yellow; mesonotum black, with coarse longitudinal striation. . *rikatlensis*, Schulthess.
17. (16) Black; abdomen with white apical fasciae; tergite 2 with large lateral spots, white. . *metatarsalis*, Schulthess.
18. (15) Sides of median segment distinctly punctured; mesonotum evenly punctured, postscutellum, post-tegulae and clypeus basally, ferruginous. . . *hansi*, sp. n.
19. (2) Scutellum flat, unarmed (except *O. dimorphus* (♂)); postscutellum either forming two distinct tubercles or truncate, crenulate or with lateral tubercles.
20. (23) Tegulae abnormally large.
21. (22) Postscutellum forming two distinct tubercles, tergite 2 normally rounded. Length 11½ mm. *rubroniger*, Bingh.
22. (21) Postscutellum with slender lateral tubercles, tergite 2 with a longitudinal carina. Length 10 mm. *kristenseni*, sp. n.
    (*O. cameroni*, Schultz, comes in here.)

23. (20) Tegulae normal.
24. (67) Postscutellum with lateral tubercles.
25. (32) Tergite 2 with a longitudinal carina.
26. (29) Clypeus with three conspicuous longitudinal carinae; the median one not reaching the apex.
27. (28) Tergite 2 viewed from above as broad as long; pronotum, tegulae, scutellum, postscutellum, median segment and tergite 1 (except yellow apical fascia) ferruginous.
gambiensis, sp. n.
28. (27) Tergite 2 viewed from above longer than broad, pronotum only partly, tegulae, scutellum partly and tergite 1 laterally ferruginous. . . . . *silverlocki*, sp. n.
29. (26) Clypeus without longitudinal carinae.
30. (31) Robust species; black, pronotum totally ferruginous, tergites 1 and 2 with lateral, ovate ferruginous marks.
stiraspis, Cam.
31. (30) Slender species; black, pronotum (except anterior margin medially) tergites 1 and 2 except yellow apical fasciae, black. . . . *sjöstedti*, Cam. ♀ (= *yngvei*, Cam. ♂).
32. (25) Tergite 2 without a longitudinal carina.
33. (44) Clypeus (♀) distinctly punctate striate, clypeus (♂) less distinctly sculptured.
34. (39) Clypeus (♂ and ♀) pale; yellow or ferruginous, no black markings.
35. (36) Abdominal segment 1 very short and broad; black yellow and ferruginous, a robust insect; all the tergites with yellow apical fasciae. Total length 9 mm.
pakasae, sp. n.
36. (35) Abdominal segment 1 more slender, a distinct constriction between segments 1 and 2.
37. (38) Tergites 1 and 2 with narrow yellow apical fasciae; terminal segments ferruginous. . . . . *whiteanus*, Cam.
38. (37) No yellow markings; tergites 4–6 entirely black.
dimorphus, sp. n. ♀.
tergites 4–6 orange. . . . . *dimorphus*, sp. n. var.
(*O. senex*, Cam., comes in here.)
39. (34) Clypeus (♀) black, basally yellow; clypeus (♂) yellow.
40. (41) Scape, flagellum basally and tegulae ferruginous; terminal abdominal segments ferruginous. . *silaensis*, Sauss.
41. (40) Scape beneath yellow; tegulae whitish yellow with centre black; terminal segments of abdomen black, with yellow apical fasciae, and fascia on tergite 1 enlarged laterally.
42. (43) Median segment black, no yellow markings on surface of

truncation, the yellow very pale; tergites 1–5 with pale yellow apical fasciae, length 12 mm.

asmarensis, Schulthess.

(*O. armatiscutis*, Cam., comes in here.)

43. (42) Median segment with yellow markings on sides; tergites 1–4 with pale apical fasciae. Length 10 mm.

arethusae, sp. n.

44. (33) Clypeus with distinct punctures, not striate (♂ ♀).

45. (46) Large species – 12 mm. to apex of tergite 2. Black; pronotum, tegulae, scutellum, postscutellum, laterally, ferruginous; abdomen yellow, tergites 1 and 2 with large median marks, black. . . . *signatus*, Smith.

46. (45) Smaller species (about 8 mm.).

47. (54) Thorax and abdomen without any ferruginous markings.

48. (51) Males.

49. (50) Scutellum with two linear yellow marks, tegulae yellow with dark centre. . . . . *metemmensis*, Magretti.

50. (49) Scutellum and postscutellum with yellow markings, tegulae ferruginous. . . . . *defractus*, Buysson.

51. (48) Females.

52. (53) Pronotum, tegulae, scutellum postscutellum and abdominal segments 1 (except basally) wholly and 2–6 with black apical fasciae, pale yellow; median segment red.

ukerewensis, Schulthess.

53. (52) Pronotum with the anterior margin narrowly, abdominal segments 1 and 2 with complete apical fasciae, yellow; segment 3 laterally yellow; clypeus three coloured, yellow basally, black medially and red apically. Tegulae red. . . . . *karibae*, sp. n.

54. (47) Thorax or abdomen (sometimes both) with profuse ferruginous markings.

55. (64) Apex of clypeus with a distinct emargination, the lateral teeth sharp. Males and females.

56. (57) Sides of median segment alone ferruginous.

jocosus, Gerst.

57. (56) Thorax and abdomen ferruginous.

58. (59) Prothorax without conspicuous lateral angles; clypeus long, pyriform. . . . . *vulneratus*, Sauss.

59. (58) Prothorax with acute lateral angles, clypeus as broad as long. Males.

60. (61) Anterior margin of pronotum and abdominal segments 1 and 2 with narrow apical yellow fasciae, scutellum ferruginous, only the sides with small ivory yellow spots. . . . . *goniodes*, Schletterer.

61. (60) Anterior margin of pronotum and abdominal fasciae on segments 1 and 2 broad; scutellum largely marked with yellow.
62. (63) Vertex ferruginous; abdominal segments 1 and 2 ferruginous with yellow apical fasciae. . *pulchellus*, Gerst.
63. (62) Vertex black; abdomen with considerable black markings. *solstitialis*, Sauss.
64. (55) Clypeus apically truncate.
65. (66) Mesonotum ferruginous; scutellum and postscutellum yellow, anterior margin of pronotum broadly yellow. Male. . . . . *fervidus*, Sauss.
66. (65) Mesonotum black; scutellum and postscutellum ferruginous, anterior margin of pronotum narrowly yellow. Female. . . . . *tropicalis*, Sauss.
67. (1)Postscutellum without lateral tubercles.
68. (140) Median segment without any dorsal area behind the postscutellum.
69. (86) Postscutellum with hind margin transverse, truncate.
70. (81) Sides of median segment with carinae, often serrate.
71. (72) Upper margin of postscutellum 3-tuberculate, mesonotum with 2 conspicuous carinae approximating posteriorly. *carinulatus*, Sauss.
72. (71) Upper margin transverse, usually crenulate.
73. (76) Upper angles of median segment separated from sides of postscutellum by a distinct fissure; colours yellow and ferruginous.
74. (75) Wings hyaline, only the radial cell fuscous, prothorax yellow on the anterior margin. . *rhynchoides*, Sauss. (= *saussurei*, André).
75. (74) Wings fuscous except basal third, prothorax ferruginous. *pseudolateralis*, sp. n.
76. (73) No fissure separating median segment from postscutellum.
77. (80) Larger species, about 13 mm. (to apex of tergite 2); wings bicolorous.
78. (79) Abdomen orange, segments 1 and 2 and a dorsal longitudinal mark, black; wings bluish, costal area ferruginous. . . . . *tectus*, Fab.
79. (78) Black and ferruginous, wings basally flavohyaline, apically bluish. . . . . *meyeri*, Cam. tergite 2 with narrow interrupted white apical fascia. var. *albolimbatus*, Schulthess.
80. (77) Smaller species, about 9 mm. (to apex of tergite 2). Wings unicolorous. Thorax black and ferruginous, tergite 2 with yellow apical fascia, wings fuscohyaline. *euryspilus*, Cam. (= *broomi*, Cam.).

81. (70) Sides of median segment without any carinae, suboblique.
82. (85) Abdomen black with apical fasciae ferruginous or yellow.
83. (84) Apical fasciae ferruginous, postscutellum black.
schultzeanus, Schulthess.
84. (83) Apical fasciae yellow; postscutellum with yellow marks.
vaalensis, Cam.
85. (82) Abdomen entirely brick red, thorax obscurely ferruginous.
deceptor, sp. n.
86. (69) Postscutellum with the hind margin curved, sides of median segment without any distinct carinae, rounded or produced to form lateral tubercles.
87. (111) Abdominal segments 1 and 2 without conspicuous lateral spots; general facies black, with yellow abdominal fasciae, or black and ferruginous or wholly black.
88. (96) Sides of median segment rounded.
89. (90) Wholly black; mandibles, clypeus, antennae and legs ferruginous (group of *O. floricola*). *cnemophilus*, Cam.
90. (89) Partly black; with apical margins of tergites yellow, legs ferruginous.
91. (92) Clypeus with two longitudinal carinae, pronotum anteriorly, scutellum laterally and postscutellum, yellow; tegulae ferruginous. . . . . *kilimandjaroensis*, Cam.
92. (91) Clypeus without any carinae, longitudinally striate.
93. (94) Larger, 8–10 mm. (to apex tergite 2).
hottentottus, Sauss. (= *erythrospilus*, Cam.).
94. (93) Smaller, 6–7 mm. (to apex tergite 2).
95. (96) Minutely punctured, clypeus (♀) black, yellow basally and longitudinally striate; tergite 2 with an indistinct longitudinal carina, apical fascia on tergite 1 linear.
capicola, sp. n.
96. (88) Sides of median segment subcarinate or with blunt teeth.
97. (110) Not wholly black.
98. (103) Abdomen impunctate.
99. (100) Abdomen unicolorous fuscoferruginous, without any pale markings; wings golden hyaline, apically infuscate.
lateralis, Fab., var. *unicolor*, Schulthess.
100. (99) Abdomen not unicolorous.
101. (102) Abdomen with a broad longitudinal yellow line on each side along the whole length . . . *lateralis*, Fab.
102. (101) Tergite 1 at least with a pale apical fascia.
lugubris, sp. n.
103. (98) Abdomen more or less punctured, the tergites with at least the apical areae punctured.
104. (107) Abdomen wholly punctured; postscutellum yellow.

105. (106) Colours entirely ferruginous; clypeus, thorax partly and abdominal segments 1–3 with narrow apical fasciae.
combustus, Smith.

106. (105) Colours black, ferruginous and yellow; all the abdominal segments with yellow apical fasciae.
curvirufolineatus, Cam.

107. (104) Abdomen punctate only on the apical margin of tergites.

108. (109) Tergites 2–6 with apical margins coarsely punctured, tergite 2 with a pale narrow apical fascia; clypeus not apically emarginate; dark ferruginous and black insect.
marginipunctatus, sp. n.

109. (108) Tergites 1–6 with punctate apical margins, head and thorax black with yellow markings; abdominal segment 1 black, 2–6 black and yellow; clypeus with broad, round emargination, with sharp teeth at sides.
bothriogaster, Schletterer.

110. (97) Wholly black; postscutellum sometimes yellow.
aureosericeus, sp. n.

111. (87) Abdominal segments 1 and 2, or one of them, with conspicuous lateral spots, sometimes more or less confluent above, and apical fascia on tergite 2 sometimes much dilated laterally; general fascies variable, ferruginous and yellow or black and yellow.

112. (127) Clypeus with the apex emarginate; the emargination either round and broad with lateral teeth or indistinct, formed by the approximation of two small apical teeth.

113. (120) Emargination at apex of clypeus round and broad.

114. (115) Sides of median segment forming tubercles; abdominal segments ferruginous and black with yellow spots.
stiraspis, Cam.

115. (114) Sides of median segment rounded, abdomen yellow and black or ferruginous and black; clypeus yellow or ferruginous (♂).

116. (117) Abdomen yellow and black, no ferruginous; clypeus ferruginous (♂). . . . . *scripticeps*, Cam.

117. (116) Abdomen ferruginous and black, with yellow apical fasciae.

118. (119) All the tergites with yellow apical fasciae. Length 10 mm. . . . . *simplidentatus*, M.-Waldo.

119. (118) Tergites 1 and 2 only with narrow apical fasciae, Length 7 mm. . . . . *stellaboschensis*, Cam.

120. (113) Emargination at apex of clypeus formed by the approximation of two small apical teeth.
(Here comes in *O. acthiopicus*, Sauss.)

121. (126) Colour mostly black; thorax mostly black or black with extensive yellow or ferruginous markings.
122. (123) Median segment concave, coarsely trans-striate, laterally subtuberculate; thorax almost entirely black. Abdomen almost impunctate.
14-*maculatus*, Schulthess.
123. (122) Median segment suboblique, rounded, evenly punctured. Prothorax ferruginous or yellow.
124. (125) Prothorax ferruginous red; all the abdominal segments black, with interrupted yellow fasciae.
schulthessi, sp. n.
125. (124) Prothorax yellow; abdominal tergites 5 and 6 red.
wellmani, M.-Waldo.
126. (121) Mostly ferruginous, prothorax and postscutellum yellow.
aequinoctialis, Sauss.
(Here come in *O. erythrotomus*, Cam., and *O. meruensis*, Cam.)
127. (112) Clypeus with the apex truncate.
128. (133) Postscutellum above a small transverse carina.
129. (132) Species with considerable black markings.
130. (131) Clypeus almost impunctate. Length 12½ mm.
spoliatus, Cam.
131. (130) Clypeus distinctly punctured. Length 10 mm.
indecorus, Cam.
132. (129) Species without any black markings; ferruginous, with pronotum anteriorly and abdominal segments 1 and 2 bordered with yellow. . . . . *mutabilis*, Sauss.
(*O. falcatus*, Tullgren, comes in here.)
133. (128) Postscutellum without any transverse carina.
134. (137) Abdomen impunctate.
135. (136) Clypeus (♀) yellow, impunctate, postscutellum and median segment yellow. . . . *bellatulus*, Sauss.
136. (135) Clypeus (♀) red, punctured; abdomen without any yellow markings. . . . . *rotundiscutis*, Cam.
137. (134) Abdomen more or less punctured.
138. (139) Clypeus entirely yellow (♂ ♀) as broad as long, scutellum (9 specimens) ferruginous. . . . *harrarensis*, sp. n.
139. (138) Clypeus (♀) basally yellow, distinctly longer than broad; scutellum (12 specimens) with some yellow.
sheffieldi, sp. n.
(Here come in *O. macrocephalus*, Grib., *O. multicolor*, Sauss., *O. mutans*, Sauss.)
140. (68) Median segment with a distinct dorsal surface posterior to postscutellum (div. *Stenodynerus*).

141. (142) Totally black species; clypeus (♂) clothed with dense silver pubescence; abdomen evenly punctured.
corvus, sp. n.

142. (141) Not black; abdomen almost wholly orange or ferruginous, abdomen impunctate.

143. (144) Clypeus densely clothed with silvery pubescence; clypeus bidentate at apex; wings fuscous. *bairstowi*, Grib.

144. (143) Clypeus bare; wings pale, subhyaline or subfuscous.

145. (146) Clypeus convex, punctured; mandibles falciform, very minutely serrate. . . . *ferrugineus*, Schulthess.

146. (145) Clypeus flat, shining, impunctate, truncate at apex; mandibles distinctly 3-dentate.
politiclypeus, Schulthess.

Subgenus *Hoplomerus*, Westwood.

1. (2) Wings unicolorous.

2. (1) Wings bicolorous, the basal half golden hyaline, apical half fuscous. Abdomen black, sometimes with obscure whitish marks on sides of apical margins of segments 3–5.
spiniger, Schulthess.
Abdomen laterally with profuse pale yellow markings.
var. *maculatus*, Schulthess.

3. (4) Head and thorax with a considerable covering of long, griseous pubescence. Mesonotum without any distinct parapsidal grooves. Abdomen black, tergites 1–2 with pale yellow apical fasciae. Length 13 mm. ♂.
simplex, Bingham.

4. (3) Head and thorax without conspicuous pubescence. Mesonotum with distinct parapsidal grooves. Abdomen otherwise coloured.

5. (6) Median segment hardly concave; clypeus, cephalic and thoracic markings yellow; abdominal segments 1–2 mostly ferruginous. . . . . *adonis*, sp. n.

6. (5) Median segment distinctly concave; clypeus, cephalic and thoracic markings ferruginous; abdomen black, with apical fasciae widening laterally, pale yellow.
zebroides, sp. n.

Subgenus Ancistrocerus Wesm.

Odynerus (Ancistrocerus) budongo, sp. n.

♀. Niger, densissime et brevissime aureo-tomentosus; mandibulis basi, clypeo (medio excepto), linea longitudinali inter antennas, sinu orbitali, macula post oculos, maculis duabus pronoto, tegulis

partim, postscutello, segmento mediano lateribus, segmentis abdominis 1–2 fasciis apicalibus, luteis. Mandibulis apice, antennis infra, tegulisque plerumque ferrugineis. Segmento primo carinis duabus transversis. Capite (vertice excepto), thorace antice, pleurisque sat crebre rugoseque punctatis; thorace postice abdomineque vix punctatis. Segmento mediano lateribus acutis. Alis subhyalinis, cellula radiali fusca. Long. 8 mm.

Black, somewhat shining, densely clothed with a very short fine pubescence, for the most part golden, but cinereous on metapleura and sternite 2. Yellow markings as above, with following addition: Coxae, femora and tibiae beneath yellow; anterior tarsi ferruginous.

Clypeus pyriform, apically bidentate.

The head with the exception of the vertex and the prothorax and mesonotum anteriorly rather coarsely punctured; the vertex and rest of the thorax almost impunctate. Propleura bordered anteriorly by a conspicuous carina, another carina is situated on the mesopleura; lateral angles of the median segment forming two sharp keels; the intervening space trans-striate. Abdomen with fine, scattered punctures. The first segment of abdomen with two conspicuous transverse carinae, the intervening space impunctate.

Length 8 mm. 1 ♀.

Uganda Protectorate: Budongo Forest, Unyoro, 3400 ft., xii. 1911 (*S. A. Neave*). Closely allied to *O.* (*A.*) *massaicus*, Cam., described from Kilimanjaro. The species comes in Saussure's Division *Epancistrocerus*.

O. (Ancistrocerus) lufirae, sp. n.

♀. Niger, punctatus; scapo infra, clypeo basi, macula frontali, macula post oculos, duabus maculis margine antico pronoti, segmentis abdominis 1–4 fasciis apicalibus, tibiisque plerumque luteis. Antennarum flagello, mandibulis, clypeo apice obscure, tegulis, tarsisque ferrugineis.

Ubique punctatus, capite thoraceque crassissime. Clypeo brevi, apice bidentato. Segmenti mediani lateribus subrotundatis. Alis hyalinis, cellula radiali infuscata. Long. 7 mm.

Black, coarsely punctured on head and thorax, less coarsely on abdomen. Yellow and ferruginous markings as above, covered with a sparse, pale pubescence. Clypeus as broad as long, slightly convex, narrowly produced towards apex, which is bidentate, the two teeth forming the termination of longitudinal carinae starting in the apical half of the clypeus. Ocelli on a slightly raised area on vertex. Pronotum with lateral angles acute, gradually widening

towards tegulae. Postscutellum and median segment truncate, the latter concave medially, its lateral angles rounded. First abdominal segment bell-shaped, widening posteriorly, narrower than second at base. Wings clear hyaline, slightly fuscous on part of costal area and in radial cell. ♂ differs only sexually, flagellum black.

Length 7 mm. 1 ♀, 2 ♂♂.

S.E. Congo Free State: Lufira R., Katanga, 3500 ft.; Lualaba River, v. 1907 (2 ♂♂); Kambove, Katanga, vi. 1907 (4000–5000 ft.), ♀ (type), (*S. A. Neave*).

O. (Ancistrocerus) neavei, sp. n.

♂. Niger; clypeo basi excepto, mandibulis, maculis inter antennas et post oculos, pronoti margine antico plus minusve, segmentisque abdominalibus 1 et 2 fasciis apicalibus, luteis. Capite, thorace tegulis exceptis, segmentoque abdominali primo plerumque rugose punctatis; tegulis segmentisque 2–7 vix punctatis. Alis infuscatis, ampliatis. Long. 11 mm.

Head, thorax, and first segment of abdomen with a long, somewhat sparse, covering of griseous pubescence, rest of abdomen with a dense short silvery pubescence on the ventral surface. Wings very ample.

Clypeus as broad as long, narrowly produced towards apex, which is deeply emarginate. Head about as broad as thorax at widest. Terminal joint of antennae forming a hook. Anterior margin of pronotum truncate, the pronotum widening towards the tegulae. Scutellum flat, divided from the postscutellum by a distinct transverse groove, postscutellum subtruncate, raised; median segment with a short dorsal area, the sides of the truncation rounded and produced to form blunt lateral tubercles. Surface of the truncation finely trans-striate. Head, thorax, except tegulae, and the surface of truncation of median segment, and abdominal segment 1 posterior to the transverse carina, regularly and deeply punctured; the rest shining, finely punctured. Abdomen slender, a slight constriction between segments 1 and 2.

♀ differs from male only sexually; clypeus black, with 4 yellow marks, the basal pair minute, medio-lateral, the apical pair elongate almost reaching the apex, which is truncate; mandibles black, except for a minute yellow mark at base. The wings in the ♀ very ample.

Length 11 mm. 2 ♀♀, 1 ♂.

Uganda Protectorate: N. Ruwenzori (6000–8500 ft.), Nov. 1911 (type ♂) and ♀ (*S. A. Neave*); Ruwenzori

(8000 ft.) 17. ii. 1912 (*Captain J. Fraser*), 1 ♀. Resembles *O.* (*A.*) *neuvillei*, Buyss., but differs from it in having only two yellow abdominal fasciae.

The following species were included as belonging to this subgenus in Gen. Insectorum (Vespidae); two of them are referable to the genus *Labus* and the third to *Rhynchalastor*.

Rhynchalastor xanthosoma (Schletterer).

Odynerus (*Ancistrocerus*) *xanthosoma*, Schletterer. Ann. Soc. Ent. Belg., vol. 35, p. 24 (1891).

Through the kindness of Dr. Severin I examined the type of this species. It is an undoubted *Rhynchalastor*, nearly related to *R. fuscipennis*, M.-Waldo.

In his recent paper on *Odynerus* (Soc. Entom. xxix, No. 14, p. 73, 1914) Schulthess describes *O.* (*Stenodynerus*) *ferrugineus* var. *mafiensis*, which he says is identical with *Rhynchalastor fuscipennis*, at the same time stating that there is an evanescent fourth joint in the labial palpi. On a further close examination I am inclined to agree with him. There remain, however, two characters which are of sufficient importance to render the genus valid, viz. the acute apex to the clypeus and the petiolate second cubital cell.

In any case, if the var. *mafiensis* is considered synonymous with *R. fuscipennis* (1910), why is a new varietal name selected? Finally, it would seem that on structural characters of the clypeus this variety was worthy of specific rank, since in the type form the clypeus is diagnosed as follows: "clypei truncatura apicalis aeque longa ac articulus 3 antennarum," and in the variety *mafiensis* "clypeo ♂ et ♀ apice acuto, margine apicali fere nullo."

Labus bisuturalis (Sauss.).

Odynerus bisuturalis, Sauss. Et. fam. Vesp. i, p. 127 (1852) ♂.

Through the kindness of Prof. Poulton I have been able to examine the type of this species from the Westwood Collection in the Hope Department of the Oxford Museum. It is an undoubted *Labus*, a genus created by Saussure in 1867 for the reception of two species caught during the cruise of the Novara, in Ceylon and Java respectively.

The type locality of *L. bisuturalis* is doubtful, but it is thought to have come from Senegal, which is highly probable, as many Ethiopian species are now known. The species is stated (*l.c.*) to have two transverse sutures on the first abdominal segment, but the most careful examination has failed to reveal more than one. A specimen in the British Museum from N.E. Rhodesia (Mid-Luangwa Valley) is very closely allied to it.

Labus differmis (Sauss.).

Odynerus differmis, Sauss. Et. fam. Vesp. i, p. 145 (1852) ♂.

I have not seen this species, but it appears to be a *Labus*.

Subgenus Lionotus, Sauss.

O. (Lionotus) carinatus, sp. n. (Plate XCI, fig. 7.)

♀. Niger, luteo variegatus; clypeo duabus carinis longitudinalibus conspicue instructis; mesothorace crassissime ac longitudinaliter striato; tergite secundo carina longitudinali margineque postico crenulato; pronoti margine postico elevato. Clypeo basi, carinis clypealibus, pronoto partim, segmentis abdominalibus 1 et 2 fasciisque apicalibus, luteis. Mandibulis, scapo, flagello infra, tegulis, linea scutellari, segmento primo partim, pedibusque plerumque, ferrugineis. Alis subfuscis. Long. 10 mm.

♂ differt clypeo luteo inconspicue carinato, areaque lutea pronoto ampliori. Long. 9 mm.

Head and thorax (except pleurae) covered with a medium fulvous pubescence, pleurae with silvery pubescence. Mandibles long and slender; clypeus rather longer than broad, narrowly produced towards apex, shallowly emarginate, the area between the two carinae shining almost impunctate. Pronotum truncate anteriorly, widening towards tegulae, lateral angles acute; scutellum with the lateral expansions rather inconspicuous, postscutellum with two sharp lateral tubercles; median segment concave, sides of the truncation forming ridges. First abdominal segment slender basally, second tergite with a conspicuous median longitudinal carina almost reaching the apex; apex crenulated impunctate.

Head and thorax coarsely punctured, mesonotum especially with conspicuous longitudinal striation, surface of the truncation of the median segment more finely punctured. Wings fuscous.

♂ differs from ♀ in having the carinae on clypeus less distinct and the yellow on pronotum more widely distributed.

Length 9–10 mm. 1 ♂, 1 ♀.

Cape Colony: Willowmore, Feb. 1903 and Jan. 1911 (*Dr. H. Brauns*). Coll. No. 14.

O. (*Lionotus*) *4-tuberculatus*, Smith. (Plate XCI, fig. 3.)

In my earlier paper (Ann. Mag. Nat. Hist. (8), xi, p. 52, 1913) *O. pulchripilosellus*, Cam., is treated as synonymous with the above; since then I have come to the conclusion that they are distinct; Schulthess (Archiv. F. Zoologi, Bd. 8, No. 17, p. 16 (1913) is of the same opinion.

O. instabilis, Smith.

O. instabilis, Smith. Catal. Hymen. Brit. Mus., v, p. 73 (1857) ♀ ♂.

The type of this species is missing.

Nortonia eumenoides (Smith).

Odynerus eumenoides, Smith. Catal. Hymen. Brit. Mus., v, p. 71 (1857).

This species, the type of which is in the British Museum, is referable to the above genus. It was described from Natal.

O. (Lionotus) hansi, sp. n.

♂. Niger, ferrugineus; segmentis 1–3 fasciis apicalibus luteis; clypeo basi, antennis infra, macula inter antennas, linea post oculos, pronoto, tegulis, scutello, postscutello, segmenti mediani lateribus, abdominis segmentis 1 et 2 plerumque, maculaque pleuris, ferrugineis; pedibus ferrugineis. Alis fuscis. Long. 8 mm.

Head and thorax clothed with a short, dense, fulvous pubescence; clypeus convex rather longer than broad, with two small teeth at apex, the space between truncate; mandibles stout, subtruncate; thorax robust, anterior margin of pronotum truncate, almost as wide as thorax at tegulae; scutellum slightly raised, laterally raised into expansions, postscutellum with two distinct tubercles; median segment concave, the lateral angles rounded.

First abdominal segment broad, bell-shaped; second segment rounded normally above. Head, thorax and median segment rather coarsely punctured, the abdomen more finely; mesonotum with some longitudinal striae. Wings fuscous.

Length 8 mm. 1 ♂.

Orange Free State: Bothaville, 20. xii. 1898 (*Dr. Hans*

Brauns). Coll. No. 15. Dedicated to the captor and donor. A stout species, easily recognised by the sculpture of the scutellum and postscutellum, the general appearance is ferruginous.

O. (Lionotus) kristenseni, sp. n.

♀. Niger, luteo-variegatus ac fasciatus; mandibulis clypeoque basi, macula inter antennas, pronoto antice, scutello lateribus, post tegulis, abdominis segmentis 1–4 fasciis apicalibus completis, segmento 5 fascia apicali mediano, tibiis tarsisque, flavo-luteis; tegulis maximis; femoribus I et II plerumque, tegulisque ferrugineis. Alis subhyalinis, area costali subfusca. Long. 8 mm.

Head and thorax clothed with a short silvery pubescence, most conspicuous on pleura and median segment; abdomen more sparingly clothed with a similar pile. Clypeus hardly so broad as long, very finely punctured, narrowly produced towards apex, apex weakly bidentate. Mandibles rather slender. Thorax about as wide as head; lateral angles of pronotum acute, the pronotum gradually widening towards tegulae; scutellum flat, but rather raised above mesonotum, postscutellum truncate, laterally armed with sharp tubercles; median segment subtruncate, the lateral angles rounded. Abdominal segment 1 rather slender, abruptly widening towards apex; tergite 2 longer than broad, with a distinct median longitudinal carina which does not reach either the extreme base or apex of the segment. Tegulae very large, sparsely but distinctly punctured. Head, thorax and abdomen all punctured; the mesonotum rugose and longitudinally striate; concavity of median segment almost imperceptibly punctate, the abdomen finely but regularly punctured. The yellow markings on legs grade into ferruginous, tarsi almost entirely ferruginous.

Wings subhyaline, rather smoky along the costa.

Length 8 mm. 1 ♀.

Abyssinia: Harrar (*Gunnar Kristensen*), May 1911, presented to the British Museum by R. E. Turner.

This species is easily recognisable by the abnormally large tegulae, and longitudinal carina on tergite 2.

O. (Lionotus) gambiensis, sp. n.

♀. Niger, luteo-ferrugineoque variegatus; clypeo, pronoti margine postico, abdominisque segmentis 1–4 fasciis apicalibus luteis; mandibulis, antennis, sinu orbitali, macula post oculos; pronoto, tegulis, scutello, postscutello, macula mesopleuris, segmenti mediani lateribus, abdominis segmentis primo, et sexto

maculis, segmento secundo, pedibusque plerumque, ferrugineis. Alis subhyalinis. Tergite 2 carina longitudinali conspicua instructa. Clypeo tricarinato. Long. 8 mm.

Clothed with an inconspicuous silvery pubescence on head, thorax and abdomen. Clypeus elongate, almost twice as long as broad, with three longitudinal carinae, the median one hardly reaching the apex; apex very slightly excised. Mandibles acute, slender, but not abnormally long.

Scutellum considerably raised, truncate laterally; postscutellum with distinct lateral tubercles. Median segment concave, slanting, lateral angles blunt, but forming distinct ridges. First abdominal segment slender basally, but widening abruptly towards apex; second tergite with a conspicuous longitudinal keel, reaching the apical yellow fascia. The following segments telescoped, but certainly with yellow fasciae. The whole coarsely punctured, but especially the pro- and mesonotum; clypeus shining only sparingly punctured. Wings subhyaline.

Length 8 mm. 1 ♀.

GAMBIA: 15. iii. 1911 (*J. J. Simpson*).

The clypeal and abdominal carinae render this species easy to identify.

O. (Lionotus) silverlocki, sp. n. (Plate XCI, fig. 4*a*, 4*b*.)

♀. Niger, punctatus; clypeo longitudinaliter tricarinato, tergite 2 carinato; clypeo, antennis, macula inter antennas, pronoti marginibus, tegulis, scutello partim, tergite 1 lateribus, pedibusque coxis, trochanteribus, femoribusque, ferrugineis. Maculis parvis sinu orbitali, et post oculos ferrugineis. Segmentis 1–3 fasciis apicalibus, tibiis tarsisque, luteis. Alis fuscis. Long. 8 mm.

Head and thorax clothed with pale pubescence. Clypeus twice as long as broad, with three conspicuous longitudinal carinae, its surface black at the sides; the apex narrow, truncate. Pronotum truncate anteriorly, the lateral angles not particularly salient, ferruginous along both anterior and posterior margins. Both scutellum and postscutellum raised, scutellum with lateral expansions, postscutellum truncate posteriorly, armed with small sharp tubercles on each side. Median segment oblique, rounded laterally, each side produced to form a distinct tubercle towards the apex. Segment 1 short, globose; segment 2 distinctly longer than broad. The whole head and thorax coarsely punctured, the punctures on the mesonotum especially coarse, and forming striae. Punctures on abdomen finer, apical fasciae impunctate. Wings fuscous,

Length 8 mm. 3 ♀♀.

N. Rhodesia: 85 miles west of Kariba Gorge, vi. 1910, type (*O. C. Silverlock*), 2 ♀; Lower Luangwa River, ix. 1910 (*S. A. Neave*). 1 ♀.

Dedicated to its captor, the late O. C. Silverlock, who was drowned in the Zambesi River, owing to his canoe being overturned by a hippopotamus. The species may be distinguished from *O. gambiensis* by the different shape of the second tergite, and distribution of colour.

O. (Lionotus) pakasae, sp. n.

♀. Flavo-ferrugineus; capite plerumque, mesothorace, nigris; clypeo, scapo infra macula triangulari supraclypeali, sinu orbitali, macula lineari post oculos, pronoto, tegulis, scutello, postscutello, tergite 1 anguste, 2–6 late fasciis apicalibus tergite 2 lateribus, flavis; mesopleuris plerumque pedibusque, flavis; mandibulis, antennis, segmento mediano, abdominis segmentis 1 et 2 (areis flavis exceptis) coxis anticis ferrugineis; alis fuscis. Long. 8 mm. ♂ similis.

Clothed with a very short, pale pubescence. Clypeus rather longer than broad, pyriform, very slightly emarginate at apex. Pronotum truncate anteriorly, rather wider at the tegulae; scutellum and postscutellum raised, the lateral teeth of postscutellum acute, the space between them not crenulate; median segment with the lateral angles rounded. First abdominal segment very short and broad, the second as broad as long, the first segment entirely ferruginous except for the apical fascia, the second with a large dorsal bilobed area ferruginous, the sides and apex, yellow, following segments with a series of fuscous lateral spots. Posterior coxae with a distinct tubercle behind.

Head and thorax (except clypeus, tegulae and abdominal segments apically) coarsely punctured; clypeus, tegulae, median segment and abdomen for the most part finely punctured. Wings fuscous.

Length 8 mm. 5 ♀♀, 1 ♂.

N. Rhodesia: Pakasa, i. 1911, 3 ♀♀ 1 ♂; Sinapunga, ii. 1911 (*O. C. Silverlock*), 1 ♀; Portuguese East Africa: Rikatla, Delagoa (*Junod*), Schulthess Coll., 1 ♀; German S.W. Africa: Grootfontein (*Volkmann*), Coll. Schulthess.

The specimen from German S.W. Africa is a colour variety with the 4–6 segments of abdomen orange instead of black.

The species is a distinct one, the different sculpture in the postscutellum of the sexes being interesting.

O. (Lionotus) dimorphus, sp. n.

♀. Niger, aurantiacus; antennis basi ac infra, mandibulis, clypeo, macula supraclypeali, sinu oculorum, macula lineari post oculos, pronoto, maculis mesopleuris, tegulis, scutello, postscutello, segmenti mediani lateribus plerumque, abdominis segmento primo, secundo plerumque, fasciaque apicali tertio, aurantiacis; pedibus (coxis trochanteribusque exceptis) aurantiacis; alis fuscis. Long. 9 mm.

Gracilis, differt scutello bituberculato, non plano ut in ♀, clypeoque apice emarginato; coloribus similis, sed flagello; omnino nigro. Long. 8 mm.

Sparingly clothed with pale pubescence. Clypeus rather longer than broad, pyriform; the apex truncate (♀) distinctly emarginate with acute lateral teeth (♂); mandibles normal; a distinct pit on the vertex behind ocelli (♀); pronotum truncate anteriorly, the lateral angles not very acute; sides of pronotum widening towards tegulae. Scutellum raised, but flat (♀), postscutellum with sharp lateral tubercles; median segment concave, the sides rounded.

First segment of abdomen slender at base, second segment distinctly constricted basally, the black marks on its dorsal surface large, bilobed in shape, the sides orange.

Whole insect punctured; clypeus (♀) and mesonotum with striate punctate, abdomen more finely punctured, the apical margins of the tergites more coarsely punctured than the remainder. Wings fuscous.

Length 9 mm. (♀), 8 mm. (♂). 2 ♀, 1 ♂.

Orange Free State: Bothaville, iii. 1899 (*Dr. H. Brauns*); German S.W. Africa.

O. (*Lionotus*) *asmarensis* (Schulthess), Soc. Entomolog. xxix, p. 63 (1914).

This was described by Schulthess as a variety of *O. silaensis*, Sauss.; it is, however, quite distinct.

O. (*Lionotus*) *sjöstedti*, Cam.

O. yngvei, Cam., described at the same time and from the same type locality as *O. sjöstedti*, is certainly the male of that species. Cameron (Sjöstedt's Kilimandjaro-Meru Exped., p. 188, 1910) had considered this possibility; his reasons for separating them do not appear satisfactory.

O. (Lionotus) arethusae, sp. n.

♂. Niger, luteo fasciatus; scapo infra, clypeo, macula supraclypeali, sinu oculorum infra, macula post oculos, pronoto antice,

margine tegularum, axillis, segmenti mediani lateribus, tergitibus 1–4 fasciis apicalibus (quarum 1–2 lateribus dilatae sunt), luteis; pedibus (coxis trochanteribusque exceptis) flavis, tarsis subferrugineis; mandibulis ferrugineis. Alis subfuscis. Long. 10 mm.

Black, dusted with a griseous pubescence. Clypeus as broad as long, pyriform, deeply emarginate at apex, the lateral teeth acute. Prothorax truncate anteriorly. Scutellum slightly raised, postscutellum with short lateral tubercles, truncate; surface of median segment concave.

Abdomen with first segment short and broad, the second as broad as long. Head and thorax coarsely punctured, the clypeus with distinct longitudinal striation; abdomen finely punctured.

Wings subfuscous, rather darker along costa.

Length 10 mm. 6 ♂♂.

Nyasaland: Mlanje, 2300 ft., Oct. 1913 (*S. A. Neave*).

This species is dedicated to H.M.S. Arethusa, in recognition of the conspicuous part played by her in the naval engagement in the North Sea.

O. (Lionotus) karibae, sp. n.

♀. Niger, clypeo tricolorato; clypeo basi, scapo infra, macula supraclypeali, sinu oculorum infra, macula post oculos, pronoti margine antico, tergitibus 1–3 fasciis apicalibus, prima lateribus dilatata, pedibus plerumque, luteis. Mandibulis, clypeo apice, tegulisque, ferrugineis. Alis hyalinis, cellula radiali fusca. Long. 8 mm.

The whole insect clothed with a short, silver pubescence. Clypeus as broad as long, convex, the apex with a very shallow emargination. Anterior margin of median segment truncate, the lateral angles acute. Scutellum raised, slightly convex, postscutellum with the lateral teeth inconspicuous; median segment rounded laterally. First segment of abdomen short, broad. Head and thorax with coarse, deep, punctures, clypeus with the punctures well separated; abdomen more finely punctured. Wings hyaline extreme costa and radial cell fuscous. Second cubital cell nearly triangular, *i. e.* second abscissa of radius very short.

Length 8 mm.

♂ only differs sexually, the clypeus yellow and more finely punctured.

A long series of ♀♀ and 2 ♂♂.

N. Rhodesia: Kariba Gorge and E. of Sijoba, vi. 1910 (*O. C. Silverlock*) ♀♂ (type); Broken Hill, ix. 1912 (*F. V. Bruce Miller*); Lonely Mine, x. 1913 (*Dr. H. Swale*);

Chilanga (*R. C. Wood*); Upper Luangwa River, vii.–viii. 1910; Mouth of Lusangazi River, ix. 1910; Niamadzi River, 2000 ft., viii. 1910; (*S. A. Neave*). S.E. Congo Free State: Lufira River, Katanga, 3500 ft., viii. 1907 (*S. A. Neave*). Nyasaland: valley of S. Rukuru River, 3000 ft., xi. 1910 (*S. A. Neave*). The specimen from Nyasaland is not quite typical, the scutellum, postscutellum and median segment on the side being largely ferruginous.

O. (*Lionotus*) *pulchellus*, (Gerst).

Rhynchium pulchellum, Gerst., Mon. Akad. Wiss. Berlin, p. 463 (1857) ♂. Peters, Reise nach Mossambique, Zool. v, p. 466. Pl. XXX, fig. 5.

This species is certainly an *Odynerus*, as the fig. (*l.c.*) suggests.

In the British Museum there is a long series from the following localities :—

N. Rhodesia: 15 miles E. of Sijoba, vii. 1910 (*Silverlock Coll.*); Niamadzi River, 2000 ft., Luangwa River, 1910; British East Africa: Mtito Andei, 2000 ft., Masongaleni, 3000 ft., Voi, 1800 ft., iii. 1911; Nyasaland: Chitala Stream, x. 1910; Valley of N. Rukuru, Karonga District, 3000–4000 ft., vii. 1910; German East Africa: Usagara District, xii. 1910 (*S. A. Neave*).

Odynerus (*Lionotus*) *rhynchoides*, Sauss.

O. rhynchoides, Sauss. Et fam. Vesp. i, p. 174 (1852) ♂ (Senegal).

O. saussurei, E. André, Hymén. d'Europe et d'Algerie, ii, p. 682 (1881) ♀ (Egypt, Abyssinia).

This species is widely distributed. In the British Museum are specimens from the Gambia, 2 ♀♀, Tajura (Straits of Bab-el-Mandeb) 1 ♀ and Biskra, vi. 1897 (*E. Saunders Coll.*) 2 ♀♀, 1 ♂. The latter specimens were identified as *O. saussurei*, but they agree in every respect with *O. rhynchoides*, of which I have examined the type specimen, through the courtesy of the Paris Museum officials.

O. (Lionotus) pseudolateralis, sp. n.

♀. Ferrugineus, abdomine nigro, lateribus flavis; segmento sexto ferrugineo. Tegulis plerumque flavis. Alis basi subhyalinis, apice fuscis. Long. 12 mm.

Head and thorax ferruginous, the abdomen black with a broad yellow line extending along the whole length; terminal segment ferruginous.

Clypeus convex rather longer than broad, narrowly produced towards the apex, which is armed with two small teeth. Anterior margin of pronotum curved, widening towards tegulae; scutellum flat, not raised above mesonotum, postscutellum truncate posteriorly, transverse; upper angles of median segment acute, separated from sides of the postscutellum by a distinct fissure, truncation of median segment concave.

Basal segment of abdomen broad and rounded, as wide as second at base. Head and thorax coarsely and evenly punctured, abdomen more finely punctured. Wings with the basal third flavohyaline, and the apical two-thirds fuscous.

♂ differs only in having the clypeus and mandibles and a large interantennal mark, yellow. 3 ♀♀, 1 ♂.

N. Nigeria: Minna, Oct.–Nov. 1910 (*J. W. Scott-Macfie* (type) and *J. J. Simpson*); Gambia, 26. iii. 1911 (*J. J. Simpson*) ♀, and "West Africa" ♂.

The superficial resemblance between this species and the well-known *Odynerus lateralis*, Fab. (*truncatus*, Sauss.), is very striking. The differences in the structure of the postscutellum and median segment render their discrimination easy.

O. (*Lionotus*) *pseudolateralis.*	*O.* (*L.*) *lateralis* (Fab.).
Postscutellum transverse, truncate posteriorly.	Postscutellum rounded.
Lateral angles of median segment acute.	Lateral angles of median segment rounded.
Abdomen distinctly punctured.	Abdomen impunctate.

O. (*Lionotus*) *euryspilus*, Cam.

O. euryspilus, Cam. Annals Transvaal Museum, ii, p. 166 (1910) ♀. Dunbrody.
O. broomi, Cam. ? M.S. ♂. Pearston.

I can find no description of *O. broomi*, but the type specimen in the British Museum is certainly referable to *O. euryspilus*, the type of which was a ♀. Both specimens are from Cape Colony; there are also specimens (1 ♂, 1 ♀) from Willowmore, Cape Colony (*Dr. H. Brauns*), in the collection.

O. (Lionotus) deceptor, sp. n.

♀. Obscure ferrugineus, abdomine rubro; alis hyalinis. Long. 9 mm.

Clypeus longer than broad, pyriform, the apex subtruncate. Thorax robust; pronotum truncate anteriorly, only slightly widening towards tegulae; scutellum convex, slightly raised above disc of mesonotum, postscutellum transverse, truncate; surface of the truncation of median segment slightly convex, the lateral angles rounded.

Basal segment of abdomen broad, cup-shaped, without any constriction between it and segment 2.

Head coarsely and evenly punctured; clypeus and abdomen (except segments 2–6 apically) impunctate.

Length 9 mm. 12 ♀ ♀.

Portuguese East Africa: Kola Valley, 1700 ft.; Nov. 1913 (type); Nyasaland: Chitala Stream, Oct. 1910; Mlanje, 2300 ft., Oct. 1913 (*S. A. Neave*); Port Herald, Jan. 1913 (*Dr. J. E. S. Old*); Transvaal: Pretoria (*Miss J. Brincker*); N.E. Rhodesia (*Silverlock Coll.*): Resembles a small *O. carinatulus*, Sauss., but differs in structure of postscutellum.

O. (*Lionotus*) *hottentottus*, Sauss. (Plate XCI, fig. 8.)

O. hottentottus, Sauss. Et. fam. Vesp. Suppl., p. 244 (1854) nom. nov.
O. posticus, Sauss. (*nec.* H. S.). Ibidem i, p. 214 (1852) ♂.
O. erythrospilus, Cam. Rec. Albany Mus., i, p. 205 (1905) ♀.

Cameron's type is from Dunbrody. There is a good series from Deelfontein (*Col. Sloggett*) and one specimen from Salisbury, Mashonaland (*G. A. K. Marshall*). This synonymy was noticed in a previous paper (Ann. Mag. Nat. Hist. (8) vi, p. 101 (1910).

O. (*Lionotus*) *spoliatus*, Cam.

O. spoliatus, Cam. Annals Transvaal Museum, ii, p. 165 (1910) ♂ ♀.
O. longstaffi, Bingham, Trans. Ent. Soc. Lond., 1912, p. 378. ♂.

Bingham's species differs in certain points of coloration, but is undoubtedly only a variety of *O. spoliatus*, Cam., the types of which are in the National collection. A South

African species: Johannesberg, xii. 1905 (*G. Kobrow*) *ex. coll. Brauns* ♂ ♀ and (*A. J. Cholmley*) ♀; Salisbury, Mashonaland (*G. A. K. Marshall*) 2 ♀♀, 1 ♂; Kranspoort, xii. 1900 (type ♀ ♂); Natal (type of *O. Longstaffi*).

O. (Lionotus) capicola, sp. n.

♀. Niger, luteo variegatus, pedibus rufis; clypeo basi, oculorum sinu, maculis post oculos, pronoti margine antico, tegulis plerumque, scutelli postscutellique maculis lateribus, abdominis segmentis 1–3 fasciis apicalibus, luteis; scapo infra, mandibulis, pedibusque, rufis; tergite 2 carina longitudinali inconspicua; alis infuscatis. Long. 7 mm.

General appearance black, segments 1–3 with yellow apical fasciae, legs ferruginous red. Whole insect clothed with short fine pubescence, that on face and pleura silvery-pruinose. Clypeus as broad as long, flat, truncate at apex, longitudinally striate; mandibles long, with a row of distinct teeth. Head broader than thorax, anterior margin of prothorax truncate, very narrow, but abruptly widening towards tegulae; scutellum raised; median segment concave, the lateral angles rounded. Head and thorax coarsely, abdomen more finely punctured; tergite 2 with an inconspicuous longitudinal carina. First segment of abdomen short. Wings smoky.

♂ similar to ♀, but with mandibles, clypeus and scape beneath yellow.

Length 7 mm. 3 ♀♀, 5 ♂♂.

Cape Colony: Willowmore (*Dr. H. Brauns*).

Odynerus lateralis, F.

Vespa lateralis, F. Spec. Insect. i, p. 466, no. 49 (1781). ♀.
Odynerus truncatus, Sauss. Et. fam. Vesp. i, p. 175 (1852). ♀.

Saussure (Et. fam. Vesp. iii, p. 171) quite excusably misidentified the Fabrician species. Two entirely distinct insects stand as *V. lateralis* in the Banks collection; the first in arrangement is the large (over 15 mm.) robust form with shining mesonotum, doubtless the *Rhynchium africanum*, Sauss.; the second, a smaller (11 mm.) insect with punctured mesonotum, compared by Fabricius as equal in size to his *V. tecta* (type in B.M.), is the genuine *Odynerus lateralis*, F. This species is identical with Saussure's *D. truncatus* (a cotype from the Paris Museum compared). It is evident

that when working through the Banks collection for additions and corrections to his Monograph, Saussure fixed on the first specimen labelled "*V. lateralis*" as the true exponent of the Fabrician species, synonymising the more recently described *R. africanum*, F. (1804), with it. Now, however, the name *R. africanum* can be reinstated.

O. (Lionotus) marginipunctatus, sp. n. (Plate XCI, fig. 6.)

♀. Niger; mandibulis, clypeo, sinu oculorum infra, antennis, area post oculos, pronoto, tegulis, axillis, postscutello, segmento mediano, segmentisque abdominis apice ferrugineis; pedibus ferrugineis; tergite 2 fascia apicali angusta lutea; alis bicoloribus, basi hyalinis, apice infuscatis. Long. 11 mm.

Black; with fusco-ferruginous markings; vertex and thorax with a short golden pubescence, the abdomen clothed with a thick griseo-pruinose pile. Mandibles medium, with blunt teeth; clypeus as broad as long, truncate, convex, pyriform; pronotum rounded anteriorly, widening gradually towards tegulae; scutellum flat, postscutellum slightly raised; median segment rounded laterally. Head and thorax evenly and distinctly punctured, abdomen with tergite 1 entirely impunctate, tergites 2–6 basally impunctate but with the apical area distinctly punctured; sternites 2–6 distinctly punctured on their whole surface. Tegulae impunctate.

Wings with the basal half hyaline the nervures golden, apical half infuscate.

Length 11 mm. 9 ♀ ♀.

Nyasaland: Mlanje, 2300 ft., 4. x. 1913 (*S. A. Neave*).

This species bears a strong superficial resemblance to *O. lateralis* var. *unicolor*, Schulthess, but that variety has the abdomen entirely smooth.

O. (Lionotus) lugubris, sp. n.

♀. Niger, obscure ferrugineo-variegatus; capite, thorace, pedibusque plerumque fusco-ferrugineis; abdomine plerumque nigro; mandibulis basi, tergiteque primo fascia apicali, luteis. Alis hyalinis, subinfuscatis, praecipue area costali cellulaque radiali. Long. 11 mm.

Black, with fusco-ferruginous markings on head and thorax. Pubescence much as in *O. marginipunctatus*. Sculpture of thorax as in that species. First segment of abdomen slender, gradually widening towards apex. Tergites wholly impunctate, sternite 2 feebly punctured. Wings hyaline, suffused with fuscous principally along the costa and in the radial cell.

Length 11 mm.

♂. Similar, but with a large triangular mark between the antennae, the lower orbits, the clypeus at base and apex, mandibles basally, and tergite 2 with apical fascia, pale yellow.

Length 11 mm. 2 ♀ ♀, 1 ♂.

Nyasaland: Mlanje, 2300 ft., vi.–x. 1913 (*S. A. Neave*).

Very near *O. marginipunctatus*, but differs as follows: Wings unicolorous, suffused with fuscous, abdomen entirely smooth.

O. (Lionotus) aureosericeus, sp. n.

♀. Niger, vix luteo-variegatus; mandibulis basi, postscutello nonnumquam, segmentique mediani lateribus infra, luteis; abdomine aureosericeo; alis infuscatis. Long. 10 mm.

General appearance black; the mandibles basally postscutellum more or less and lateral angles of median segment below, pale luteous. Clypeus rather longer than broad, convex, pyriform, the apex subemarginate with two small lateral teeth; anterior margin of pronotum truncate, the lateral angles acute; scutellum flat, not raised; lateral angles of median segment acute. Punctured as follows: head, pro- and mesonotum, scutellum postscutellum, pleura above, and median segment above, coarsely, abdomen both dorsally and ventrally, with fine punctures; pleura below, tegulae, axillae, truncation of postscutellum and median segment below impunctate. Wings infuscate, especially along the costa.

Head and thorax clothed with silver-pruinose pilosity, abdomen with golden pile.

Length 10 mm. 3 ♀ ♀.

Uganda: W. of Victoria Nyanza, Buddu, 3700 ft., ix. 1911 (type); Bugoma Forest, Unyoro, 3700 ft., xii. 1911; Matiana to Entebbe, i. 1912 (*S. A. Neave*).

The silver and golden pilosity on the head and thorax and abdomen respectively in this species is very fine and only visible in certain lights. The type specimen has a yellow transverse fascia on the postscutellum, the other two specimens, both of which are stylopised, have only the faintest traces of yellow.

O. (Lionotus) schulthessi, sp. n. (Plate XCI, fig. 11.)

♀. Niger; scapo, prothorace, pedibus (coxis trochanteribusque exceptis) ferrugineis; clypeo basi, abdominis segmentis 1 et 2 maculis lateribus, tergitibus 1–5 fasciis apicalibus interruptis, sternitibus 2–5 margine externo, luteis; alis infuscatis. Long. 11 mm.

Clypeus as broad as long, convex, pyriform, the apex formed by

two small tooth-like processes; head as broad as thorax; scutellum slightly raised, convex; median segment rounded laterally; first segment of abdomen rounded, narrower than second; abdomen as a whole rather slender. Anterior margin of prothorax truncate widening abruptly towards tegulae.

Whole insect covered with coarse, even, puncturing; segments 2–6 basally impunctate. Head, thorax and abdomen with a short pilosity, that on abdomen pruinose, silvery.

Length 11 mm. 2 ♀♀.

British East Africa: Kuja Valley, S. Kavirondo, 4000 ft., iv.–v. 1911 (*S. A. Neave*) (type): "Afrika" ♀ (*Schulthess Coll.*). (Cotype.)

Allied to *O. 14-maculatus*, Schulthess, but differs in sculpture of median segment, etc.

O. (Lionotus) sheffieldi, sp. n.

♀. Ferrugineus, nigro- et flavovariegatus; clypeo basi, macula interantennali, sinu orbitali, linea post oculos, pronoto antice, tegulis plerumque, axillis, maculis pleuris, scutello fascia interruptâ, postscutello, segmenti mediani lateribus, luteis; tergite 1, 2, maculis lateribus, fasciisque apicalibus tergitibus 3–5 fasciis apicalibus plus minusve interruptis, luteis. Clypeo medio, fronte, mesonoto antice, abdomine plus minusve fasciato, nigris. Alis subhyalinis, cellulâ radiali infuscata. Long. 10 mm.

Chiefly ferruginous, with yellow and black markings. Clypeus truncate rather longer than broad, narrowly produced towards the apex; mandibles rather elongate, feebly dentate; head about as broad as thorax, prothorax truncate anteriorly, hardly widening towards tegulae; scutellum and postscutellum flat, hardly raised above mesothorax; median segment concave, the sides rounded. First tergite as broad as long, the apex as wide as tergite 2 basally. Head and thorax with coarse, even punctures, abdomen and tegulae finely and evenly punctured. Wings subhyaline, golden hyaline along the costa, fuscous in the radial cell.

Length 10 mm. 12 ♀♀, 3 ♂♂.

Nyasaland: Mlanje, iii. 1913 (type); N.E. Rhodesia: Mid-Luangwa Valley, 2000 ft., viii. 1900; Portuguese East Africa: Valley of Kola River, 1500–2000 ft. (*S. A. Neave*); N. Nigeria: Zungeru, iii. 1911 (*J. W. Scott-Macfie*).

This widely spread and variable species is very closely related to *O. bellatulus*, Sauss., which it much resembles in colour pattern; the presence of punctures on the abdomen

at once separates *O. sheffieldi* from that species, which has the abdomen quite smooth.

O. (Lionotus) harrarensis, sp. n.

♀. Niger, magnopere ferrugineo variegatus, abdomine flavo-fasciato; clypeo, sinu orbitali infra, pronoti margine postico, tegulis plerumque, post tegulis, axillis, postscutello, tergite 1 fascia apicali angusta, segmentis 2–6 fasciis apicalibus latioribus, luteis; coxis intermediis posticisque, eburneis. Mandibulis, scapo, articulis flagelli 1–4, macula interantennali, sinu orbitali supra, area post oculos, pronoto, tegulis macula, mesonoti area mediana, scutello, segmenti mediani lateribus, segmentisque abdominalibus (fasciis apicalibus exceptis), ferrugineis; pedibus ferrugineis, tibiis posticis supra, pallide luteis. Alis hyalinis, area costali subinfuscata. Long. 11 mm.

Black, largely marked with ferruginous. Clypeus at widest broader than long, truncate at apex; anterior margin of pronotum slightly curved, widening abruptly towards tegulae; scutellum and postscutellum rounded, rather raised above mesonotum, median segment rounded laterally. Tergite 1 short cup-shaped, tergite 2 rather longer than broad. Intermediate and posterior coxae apically emarginate. Clypeus with fine longitudinal striae, head and thorax rather coarsely punctured, abdomen more finely. Median segment with a rather dense griseous pubescence, abdomen with a golden pruinose pile.

♂ similar to ♀, differs only in sexual characters, terminal joint of antennae forming a hook.

Length 11 mm. 9 ♀♀, 2 ♂♂.

Abyssinia: Harrar, May 1911 (*Gunnar Kristensen*) (type); 6 ♀♀, 1 ♂.

East Africa: (*S. L. Hinde* and *Shirati*), *Schulthess Coll.*), 1 ♀, 1 ♂.

A conspicuous species; the broad clypeus and emarginate coxae are very noticeable.

O. (*Stenodynerus*) *politiclypeus*, Schulthess. (Plate XCI, fig. 14.)

♀. *O. ferruginei* affinis; ferrugineus; mesopleuris, mesonoto, fronte, flagelloque nigris; alis subhyalinis, cellula radiali infuscata. Long. 12 mm.

Head and thorax of exactly similar width, the sides of the thorax parallel. Anterior margin of pronotum truncate. Clypeus flat,

shining, impunctate, truncate at apex, mandibles 3 dentate, medium. Scutellum and postscutellum flat, not raised; median segment with a distinct dorsal area, concave on the surface of truncation, the sides rounded. Abdomen linear, the first segment subtruncate at apex, the second of equal width. Punctured; the head and thorax coarsely and rugosely; clypeus and abdomen impunctate. Wings subhyaline, golden hyaline along the costa, fuscous in the radial cell.

Length 12 mm. 1 ♀.

Nyasaland: Mlanje, 2300 ft., Oct. 1913 (*S. A. Neave*).

Nearly related to *O.* (*S.*) *ferrugineus*, Schulthess, but distinguished from it by the impunctate clypeus and dentate mandibles.

O. (Stenodynerus) corvus, sp. n. (Plate XCI, fig. 15.)

♂. Niger; mandibulis, scapo, pedibusque ferrugineis; clypeo argenteo-sericeo, apice emarginato; alis subinfuscatis, area costali obscuriore. Long. 13 mm.

♀. Similis, sed clypeo punctato, nudo.

Clypeus convex, emarginate at apex, sides of the emargination produced to form distinct teeth, the whole about as broad as long; mandibles rather long, toothed on the inner side. Anterior margin of pronotum emarginate, the lateral angles acutely produced. Thorax massive; scutellum and postscutellum flat, median segment concave, the lateral angles serrate. Abdominal segment 1 somewhat elongate, linear, only slightly narrower than second, sternite 2 irregular broadly subtuberculate. Head and thorax coarsely, abdomen finely and evenly punctured; median segment with a small impunctate area on the dorsal surface on each side. Clypeus and coxae clothed with dense silvery pubescence, abdomen with a dense pale golden sericeous pile.

Length 13 mm.

♀ similar to ♂, but the clypeus destitute of pubescence, and the median segment lacking the impunctate area on its dorsal surface. Sternite 2 flat, not subtuberculate. 4 ♂ ♂, 8 ♀ ♀.

Nyasaland: Mlanje, ix. 1913 (type) ♂ ♀; Shire Valley (*S. A. Neave*) ♀.

British East Africa: Masongaleni, 3000 ft., iii.–iv. 1911 (*S. A. Neave*) ♀.

Slopes of Mt. Kenia, ii. 1911 (*T. J. Anderson*). ♀. S.E. Rhodesia: Mount Chirinda, Gaza Land, iii. 1907. (*G. A. K. Marshall* and *David Odendal*). ♂ ♀.

A black species, the silvery pubescence on the ♂ clypeus is very conspicuous.

Subgenus Hoplomerus, Westwood.

O. (*Hoplomerus*) *spiniger.*

O. (*Hoplopus*) *spiniger*, Schulthess. Soc. Entomolog. xxix, No. 14, pp. 73–74 (1914).

This species has well-developed tubercles on the sides of the median segment; the male has the antennae rolled in spiral, as is usual in the subgenus *Hoplomerus* (*Hoplopus*). Typical species of this subgenus, of which *O. spinipes*, L., may be considered the type, have the median segment rounded posteriorly on the sides, so that it is doubtful whether the species under discussion is really referable to the subgenus. Possibly the Ethiopian representatives of the unwieldy genus *Odynerus* will eventually subdivide into further subgenera. For the present it is better to include them in *Hoplomerus*, on the strength of the male antennal characters.

O. (Hoplomerus) zebroides, sp. n.

♀. Niger; mandibulis, clypeo, antennis basi, macula interantennali, linea post oculos, pronoto, scutello, postscutello, tegulis, maculisque mesopleuris ferrugineis; pedibus (coxis trochanteribusque exceptis) ferrugineis; oculorum sinu, abdominis fasciis apicalibus interruptis, lateribus dilatatis sternitibus extremis lateribus, pallide luteis. Alis flavohyalinis. Long. 13½ mm.

A robust species, with the head and thorax broad. Clypeus convex, as broad as long, shallowly emarginate at apex; mandibles stout, apically dentate; anterior margin of pronotum truncate, the sides rounded, and slightly widening towards the tegulae; disc of mesonotum with a series of shallow but distinct sulci (parapsidal grooves; scutellum on a rather higher plane than mesonotum, postscutellum truncate posteriorly; median segment concave, the sides produced to form prominent tubercles. First segment of abdomen broadly rounded, short, following segments of normal sculpture.

Head and thorax with coarse, even punctures, abdomen more finely punctured. The head and median segment with a thick covering of pale pubescence, the rest with a fine short sericeous pile.

Wings unicolorous golden hyaline, rather fuscous in radial cell. Length 13½ mm.

♂ rather slenderer than ♀, but coloured similarly. Wings paler in basal half. Clypeus and labrum pale luteous. 2 ♀♀, 3 ♂♂.

British East Africa: Ongotta, Nairowa, vii.–ix. 1902 (*C. S. Betton*) (type ♀); "Brit. E. Africa" (*S. L. Hinde*). 3 ♂♂.

O. (Hoplomerus) adonis, sp. n.

♀. Niger; clypeo, macula interantennali, sinu orbitali, area post oculos, pronoto, mesonoto antice macula propleuris, scutello, postscutello, axillis, segment omediano, abdominis segmento primo plerumque sterniteque secundo plerumque, tergitibus 2 et 3 maculis apicalibus, luteis; scapo, articulis 3–4, mandibulis, tegulis, post tegulis, linea mesonoto longitudinali, abdominis segmentis 1 et 2 supra, ferrugineis. Pedibus ferrugineis, femoribus I infra luteis. Alis flavohyalinis, venis aureis. Long. 16 mm.

Clypeus and mandibles with sculpture as in *O. zebroides*; pronotum narrower than head, rounded laterally, and widening considerably towards tegulae. Mesonotum with distinct parapsidal grooves, scutellum slightly raised, with a small longitudinal median carina, postscutellum as in *O. zebroides*, median segment slightly concave. Puncturing in general much as in that species, but the median segment is only feebly punctate. Vertex with golden and median segment with ivory white pubescence. Wings golden hyaline.

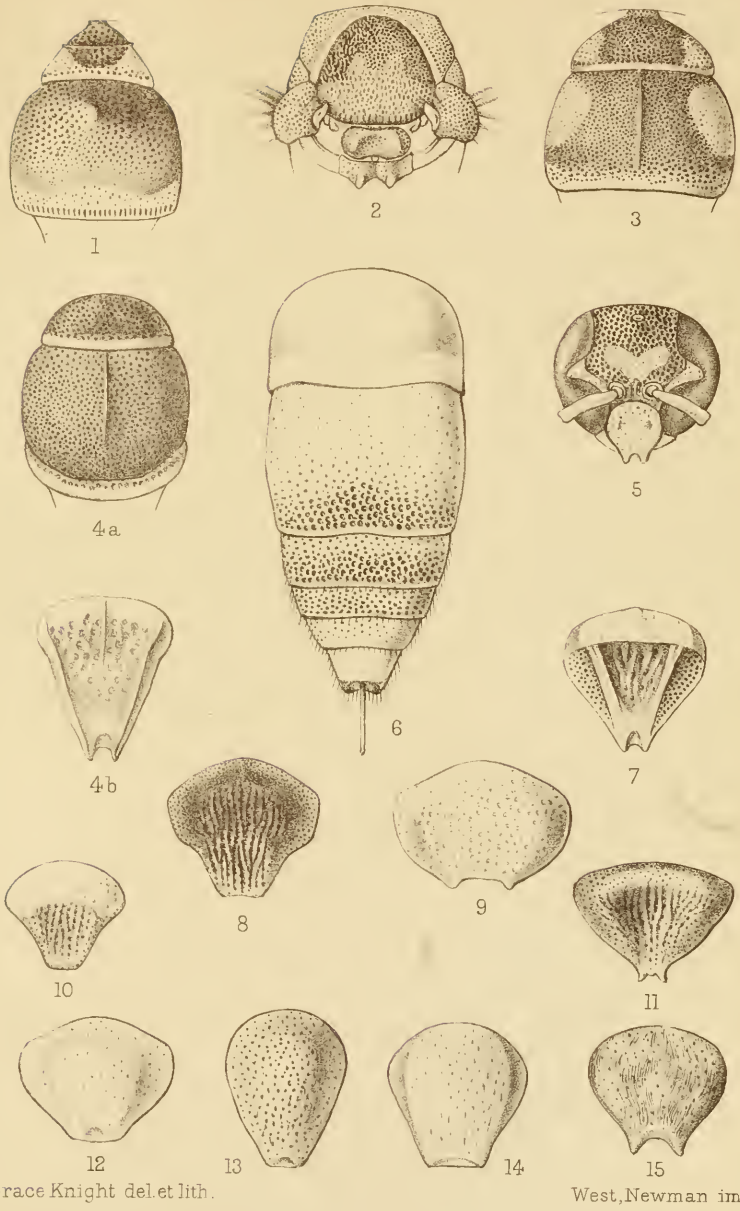
Length 16 mm.

Congo Free State: Lufira River, Katanga, 3500 ft., ix. 1907 (*S. A. Neave*). 1 ♀.

Unfortunately there is only one specimen of this fine species. Its structure is very similar to *O. zebroides*, but the difference in the degree of concavity in the median segment renders them distinct. The colour differences are very considerable.

Explanation of Plate XCI.

Fig. 1. *Odynerus* (*Ancistrocerus*) *massanensis*, Sauss. ♂. Abdominal segments 1 and 2.
2. *Odynerus* (*Lionotus*) *bisellatus*, Schulthess. ♂. Thorax.
3. *O.* (*Lionotus*) *quadrituberculatus*, Smith. ♂. Abdominal segments 1 and 2.
4*a*. *O.* (*Lionotus*) *silverlocki*, M.-Waldo. ♀. Abdominal segments 1 and 2; 4*b* clypeus.
5. *O.* (*Lionotus*) *goniodes*, Schletterer. ♂. Front view of head.
6. *O.* (*Lionotus*) *marginipunctatus*, M.-Waldo. ♀. Dorsal view of abdomen.
7. *O.* (*Lionotus*) *carinatus*, M.-Waldo. ♀. Clypeus.
8. *O.* (*Lionotus*) *hottentottus*, Sauss. ♀. Clypeus.
9. *O.* (*Lionotus*) *scripticeps*, Cam. ♀. Clypeus.
10. *O.* (*Lionotus*) *fervidus*, Sauss. ♂. Clypeus.
11. *O.* (*Lionotus*) *schulthessi*, M.-Waldo. ♀. Clypeus.
12. *O.* (*Lionotus*) *spoliatus*, Cam. ♀. Clypeus.
13. *O.* (*Stenodynerus*) *ferrugineus*, Schulthess. ♀. Clypeus.
14. *O.* (*Stenodynerus*) *politiclypeus*, Schulthess. ♀. Clypeus.
15. *O.* (*Stenodynerus*) *corvus*, M.-Waldo. ♀. Clypeus.



Horace Knight del. et lith. West, Newman imp.

NEW AND LITTLE KNOWN SPECIES OF ETHIOPIAN ODYNERUS.

XIX. *On Hawaiian* Ophioninae (Hymenoptera, Fam. Ichneumonidae).

By R. C. L. Perkins, M.A., D.Sc., F.E.S.

[Read October 21st, 1914.]

In 1883 two species of Ophionines were described as belonging to the genus *Ophion* by Cameron, from four examples sent to him by Blackburn from the Hawaiian islands. These were treated as representing male and female of each species. In 1912 Morley adopted the same view as to the sexes. The four Blackburnian examples, however, represent four quite distinct species. Blackburn himself retained specimens that he considered identical with those sent to Cameron for description, and these specimens are now in my possession. The ♀ labelled *nigricans* is the same species as Cameron's described ♀ and the ♂ is identical with the ♂ type. Of the other species, *Ophion lineatus*, Cam., the ♂ and ♀ retained by Blackburn are correctly sexed and belong to the very distinct species subsequently named *Enicospilus molokaiensis* by Ashmead. Only the second example (not marked as the type) of Cameron's pair belongs to this species. In the "Fauna Hawaiiensis," vol. i, p. 341 *et seq.*, Ashmead dealt with all the known Hawaiian genera of Ophionines and described numerous species. He failed to recognise Cameron's *Ophion lineatus* in the large collection that he examined, but identified as *Ophion nigricans*, Cam., a long series of examples of a very different insect in no way related to Cameron's. It is, of course, no wonder that Ashmead should have failed to recognise Cameron's *O. lineatus*, since it is entirely misplaced generically, being an *Enicospilus* or *Henicospilus*, as some write it. On the other hand, his treatment of *Ophion nigricans* is extraordinary. In his "Classification of Genera of Ichneumons," published a year before the "Fauna Hawaiiensis" referred to above, and with the material collected by me before him, containing a great series of his *O. nigricans*, he constructed a new genus *Pleuroneurophion* for this same *nigricans*, on a single specimen collected by Koebele, while all the other examples were considered identical with Cameron's *Ophion*. Ash-

mead did not understand the specific characters of the difficult Hawaiian *Enicospilus*, and subsequently I myself described several species which are mere local forms or varieties of his. The names of these may well be dropped unless one proposes to create numbers of new names for these very variable and difficult insects. On account of the mixture of species under one name Ashmead's descriptions are impossible for correct identifications, as a study of his types and the series of specimens in the British Museum prove. Thus the eight examples under *E. mauicola*, Ashm., clearly belong to three distinct species. Most unfortunately Ashmead, when describing the parasitic Hymenoptera, applied the names of particular islands, on which they were captured, to various species (even though they were then known to be widely distributed), but did not choose his types to suit the specific names. Thus the type of *E. mauicola* is from Kilauea, Hawaii, and there is no Maui example in the British Museum series; that of *E. kaalae* is from Kauai and not from Mt. Kaala on Oahu, and so on.

Morley's work on the Ophionines does not throw much light on the Hawaiian species, as he does not include the peculiar genera characterised by Ashmead, the types of which have long been in the British Museum. *Ophion nigricans*, Cam., he retains in *Ophion*, though it is obviously an *Enicospilus* with the spot of the discocubital cell very small and faint or transparent. The variability of these spots and of the propodeal carina is of the commonest occurrence in various Hawaiian species. In the example of *O. nigricans*, retained by Blackburn, the spot is quite distinct and dark. Ashmead described the large rufescent form of this species as *E. castaneus*, but all sorts of parti-coloured varieties between this form and one entirely blackish-fuscous are known, and the variation in the propodeal carina and the discocubital spot occurs in all. Both may be seen in all stages of degeneration. Probably the species parasitises hosts of very different size, like other Hawaiian *Enicospilus*, and rufescent and black forms pair together.

The hosts of the Hawaiian Ophionini are but little known, though the cocoons are often found in numbers when one is collecting Coleoptera. *Enicospilus* is known to attack Noctuidae and Goemetridae, and *Athyreodon* is bred from Pyralidae, while a large number of immature

caterpillars of *Deilephila blackburni* was once found on the dry fore-hills behind Honolulu, all of them parasitised by what, no doubt, was a species of *Enicospilus*, though the insects were not bred.

The following table of species has been prepared after the examination of a very large amount of material, including the type set of specimens contained in the British Museum. Excepting very abnormal aberrations, I believe all the species known to me may be distinguished by it, and characters that are either noteworthy for their variation or of use for specific separation are added in brackets.

Table of Species of *Enicospilus.*

1. (30) First or basal abscissa of radius generally notably thickened between the base and middle, and a glabrous area always present beneath the basal part of the radius; mesonotum normally convex.
2. (5) First recurrent nervure forming a distinct angle at its meeting with the cubitus, and usually a little thickened or prominent at that point; hypopygium in the ♀ very strongly prominent.
3. (4) General colour yellowish or reddish ferruginous, varying in depth; stigma largely yellow or testaceous; chitinous spot in the discocubital cell always well developed, pyriform or with an apical prolongation.

   (Size very variable, ♀ from 12 to 19 mm.; transverse median nervure of front wings interstitial with the basal or not far separated from it.)

   E. molokaiensis, Ashm.
4. (3) Thorax and abdomen almost wholly black or dark fuscous, the legs also dark, except some of the tarsi; stigma dark.

   (Mesonotum rather distinctly shining, more or less rufescent at the sides in front; scutellum very finely and not closely punctured; propodeum much smoother in front than behind, and without a transverse carina; wings smoky-hyaline except the clear glabrous area; 3rd and 4th abdominal segments brownish-tinged; chitinous spot of discocubital cell pyriform.)

   E. melanochromus, sp. nov.
5. (2) First recurrent nervure forming a simple curve with the cubitus and not angulate; hypopygium of ♀ only strongly prominent in the next following species (*kaalae*, Ashm.)

6. (7) Thorax wholly black (or at most a little reddish behind the head) ♂ with the basal abdominal segment dark on the basal portion, rarely wholly black, its apex (usually) as well as the 2nd, 3rd, 4th and often the 5th segments rufous, the apical segments black or blackish; ♀ also with the intermediate segments red, the hypopygium very strongly exserted, so that in lateral view the abdomen becomes extremely wide beyond the fifth dorsal segment.

   (♂ ♀ with one distinct, but not large, chitinous spot in the discocubital cell; propodeum in the ♀ with a distinct transverse raised line or carina, sometimes as strong in the ♂, or totally absent in the latter sex; carinae of scutellum seen from in front strongly convergent behind; antennae of ♂ extending beyond the tips of the spread wings for a distance as great as half the wing-length.) . . . . . *E. kaalae*, Ashm.

7. (6) Coloration not as above; hypopygium of ♀ not unusually prominent.

8. (11) Discocubital cell with two very distinct chitinous spots and the thorax, as well as the legs, is conspicuously in part or wholly pale, yellowish or ferruginous. If the thorax and coxae are dark, then the scutellum is largely yellow and the mesonotum has definite pale lateral markings.

9. (10) Mesosternum and propodeum reddish or ferruginous, at most somewhat dusky or suffused with fuscous.

   E. longicornis, Ashm.

10. (9) Mesosternum and at least most of the propodeum black.

   E. tyrannus, P.

11. (8) Discocubital cell with one chitinous spot or none; or if with two then the coloration of the insect is quite unlike the preceding, or the second is so faint as to be scarcely perceptible.

12. (13) Thorax mostly yellow or yellowish, with a conspicuous median dark band on the mesonotum extending back to the middle; propodeum behind the transverse carina largely or mostly black; legs entirely pale, yellowish or testaceous; spot of the discocubital cell large, subtriangular or pyriform and continued all round the lower margin of the glabrous area as a faint yellow streak.

   E. nigrolineatus, Ashm.

13. (12) Insects without these characters.

14. (15) Legs yellow as in *nigrolineatus*, but with the apical half (or nearly) of all the femora black; mesonotum with the sutures and posterior part yellow, or pale.

(Face below the antennae nearly wholly ochreous; scutellum black between the carinae; propodeum above black, yellow at the base laterally; abdomen black or dark fuscous with a mediodorsal pale line extending back from the second segment; discocubital cell with one large subtriangular chitinous spot, not drawn out or produced apically; allied to *nigrolineatus*.) . . . . . *E. variegatus*, Ashm.

15. (14) Legs and mesonotum not coloured as above.

16. (17) Spot of discocubital cell large, the glabrous area above it unusually small, not much larger than this spot, which underlies the whole of the apical portion of the glabrous area (♀).

(Thorax mostly black, the scutellum convex, rugulose-punctate like some large examples of *dimidiatus*, and shining between the punctures; carina of propodeum strong, the latter being notably smoother in front than behind, the sculpture being much finer; two basal abdominal segments black or dark, the rest brownish-ferruginous.) . . . . . *E. waimeae*, Ashm.

17. (16) Discocubital cell without the above characters.

18. (25) Scutellum behind the transverse impression notably transversely convex, sometimes more or less shining, the puncturation sometimes close, and rather deep and distinct, sometimes very fine, feeble or remote. In most species the propodeum in front is conspicuously smoother than the posterior portion and often more or less shining.

19. (20) A black species with dark legs, the whole face beneath the antennae dark, except for an indistinct paler line along the eye-margins, the labrum piceous; propodeum with a very strong transverse carina, much smoother in front of this than behind, the anterior area with somewhat shining surface under a strong lens; discocubital cell with a distinct dark chitinous spot; ♀ only known.

(Scutellum rather strongly and distinctly punctured, the spaces between the punctures somewhat shining; face very wide, the eyes being strongly rounded outwardly; 2nd dorsal segment unusually strongly and densely punctured compared with allied species.

E. funereus, sp. nov.

20. (19) Species sometimes largely ferruginous or with the face beneath the antennae of this colour; if black or dark insects, the labrum is conspicuously pale and the whitish orbital lines are distinct down to the cheeks.

21. (22) Blackish or dark fuscous species (rarely with parts of the thorax rufescent) the clypeus, except for the orbital pale line, the legs for the most part, including the coxae, black or dark-coloured.

(Thorax usually nearly wholly dark, in the type the mesonotum is reddish in front, the scutellum rufescent, as also the propodeum in front of the median tubercle. Scutellum under a strong lens with very fine surface rugulosity and fine shallow punctures, remote and sometimes almost wanting; propodeum normally with the transverse carina represented only by a median tubercle or short curved line, very rarely extending to the sides, notably smooth in front of the tubercle or carina; tarsi, tibiae, and antennae or some of these sometimes pale in large examples from Hawaii, dark in equally large ones from Oahu, where a diminutive form *dimidiatus*, P., is dominant; wings sometimes unusually deeply infuscate and with the discocubital chitinous spot obsolescent (*capnodes*, P., from Hawaii), antennae very long, even in the ♀ far surpassing the apex of the spread wings.) . . . . . *E. mauicola*, Ashm.

22. (21) Ferruginous species, or if the thorax or abdomen or both are largely dark fuscous or blackish, the legs for the most part or entirely and the clypeus remain red or ferruginous.

23. (24) Scutellum very finely and feebly punctured, the punctures remote, the surface more or less microscopically rugulose, often somewhat shining; chitinous spot of the discocubital cell nearly always distinct (absent in 2 per cent. of examples examined).

(Face very wide across the eyes, these being very strongly rounded outwardly, the cheeks short; antennae in both sexes extending far beyond the apices of the spread wings. In the ♀ the carina of the propodeum is rarely complete in examples from Hawaii, sometimes altogether wanting; often represented by a median tubercle, as is normally the case in the ♂; in front of the tubercle or carina the propodeum is more or less smooth and often somewhat shining; neuration variable, the basal nervure sometimes meeting the transverse median, sometimes well separated from it, discocubital nervure varying in curvature so that the discoidal cell beneath it varies in shape.)

E. lineatus, Cam.

24. (23) Scutellum comparatively strongly and often closely o

subrugosely punctured; discocubital cell without a chitinous spot, at the most with feeble traces of one, as a hyaline thickening.

(Thorax, legs and abdomen dull reddish or ferruginous, the thorax sometimes, and the abdominal segments behind the two or three basal ones usually, suffused with brown or infuscate; yellow colour of the inner orbits only continued down into the *sinus* of the eyes, not distinct below this; labrum yellow, distinctly pale compared with the rufescent clypeus; propodeum in the ♂ with the carina usually represented only by a median tubercle, sometimes distinct, as in the ♀; sculpture in front of the tubercle or carina similar to and continuing that behind it, the surface sometimes nearly smooth at the extreme front.)

E. ashmeadi, sp. nov.

25. (18) Scutellum flatter above, usually very little convex transversely behind the anterior fossa, always dull and very densely, shallowly punctured or rugose, the lateral carinae more strongly raised; propodeum in front of the transverse carina (or the position occupied by this, when present, should it be effaced) dull, densely sculptured, much as behind the carina, but less coarsely; the carinae of the scutellum, viewed from in front, usually much less strongly convergent posteriorly than in most of the preceding species.

26. (27) Hyaline glabrous area of the discocubital cell abnormally narrow, its lower side somewhat straight, not well rounded beneath like other species, without any chitinous spot, but usually there is a hardly perceptible, faintly yellow line just beneath the lower margin of the area.

(A dull reddish or ferruginous insect, at most with the apical abdominal segments and parts of the thorax more or less suffused with fuscous; the whole face beneath the antennae yellowish-white or cream-coloured, except for a median longitudinal area beneath the frontal tubercle, the foveae of the clypeal sutures and a spot, sometimes obscure, at the middle of the apical margin of the clypeus; propodeum of ♀ with a transverse carina, sometimes obscure and then best seen, when viewed from behind, in the ♂ usually without a trace of the carina, very densely sculptured before and behind the carina, the sculpture in front rather finer. Eyes strongly rounded outwardly, the

head wide, the antennae in the ♀ reaching beyond the apex of the spread wings.) . . *E. bellator*, sp. nov.

27. (26) Hyaline glabrous area of discocubital cell normal, well rounded below, often with a distinct chitinous spot; clypeus not yellowish-white or cream-coloured except along the orbits. Insects sometimes ferruginous like the preceding, sometimes blackish or dark fuscous or parti-coloured.

28. (29) A usually nearly constant species in appearance, nearly black or dark blackish-fuscous, the discocubital cell always with two chitinous spots, the outer one small or minute and sometimes pallid or translucent; antennae of ♀ always extending far beyond the apices of the spread wings; face in both sexes wider than in the following, the eyes more strongly rounded outwardly.

(Second and following abdominal segments, or some of these, obscurely brownish or reddish tinged; Kauai specimens have the antennae and more or less of the legs pale, yellowish-brown.) . . . *E. dispilus*, P.

29. (28) A very variable species ferruginous or castaneous like *E. bellator* or blackish like *dispilus* or parti-coloured and variegate with red and dark fuscous; discocubital cell with a distinct chitinous spot or with this faint or totally wanting, rarely with a minute pallid second spot present. Face narrower than in any other species, the eyes less rounded outwardly and the antennae of ♀ reach only to the apex of the spread wings; carina of propodeum highly variable, usually very distinct and well-developed in the ♀, though sometimes (especially in undersized examples) wanting, in the ♂ often faint or altogether absent, but sometimes strongly developed as in the ♀.

(Pale orbital markings almost always widened beneath the *sinus* of the eyes.) . . . *E. castaneus*, Ashm.

30. (1) First or basal abscissa of the radius slightly and evenly thickened basally, without the somewhat irregular or subsinuate thickening observed in nearly all other species; no glabrous hyaline area beneath the radius, but the hairs are sparser in the part usually occupied by this area. Mesonotum somewhat strongly compressed at the sides, in such a way that the middle third of its width appears elevated.

(Thorax dorsally black, the scutellum and median elevation of the mesonotum red; sides of thorax reddish more or less suffused; basal abdominal seg-

ment nearly black, its apex and the rest of the abdomen brown; face apparently without whitish orbital markings, the space between the ocelli dull and densely, microscopically granular, unlike any other species. Wings clear light-fuscous; propodeum shallowly rugose-punctate to the base and without a carina; scutellum dull and very densely sculptured; discocubital nervure not angulate but rounded at its highest point, sinuated. The ♀ is unknown, as is the range of variation.) . . . . . *E. pseudonymus*, sp. nov.

The other genera of Ophionines contain few species, the separation of which presents no difficulties at present, but the genera themselves are of extreme interest and contain the most interesting forms of the tribe Ophionini that are yet known. They may be distinguished by the following table. I have not seen the typical species of *Eremotylus*, Först., and I think that Ashmead is wrong in attributing the one variable Hawaiian species to it.

Table of Hawaiian Genera of *Ophionini*.

1. (6) Transverse median nervure in the hind-wings angulated far below the middle, at ⅔ of its length from the upper extremity at least or even much lower than this. Discocubital cell (except in one species of *Enicospilus*) with a distinct glabrous area beneath the radius basally.
2. (5) Abdomen of normal shape not very long and in side view the 5th segment is not strongly elongate.
3. (4) Cubitus and recurrent nervure distinct, forming a distinct angle at their meeting, the cubitus continued basally beyond this point to form a conspicuous thick projection, the discoidal cell consequently being conspicuously pentagonal; ♀ with ovipositor and sheaths prominently exserted behind the abdomen.

   (Front wings with a glabrous area and usually with a minute, translucent chitinous spot.)

   Pleuroneurophion, Ashm.
4. (3) Cubitus and recurrent nervure usually forming a curve at their meeting, rarely an angle; in the latter case without a large thickened projection at the angulation and with the lower and upper sides of the discoidal cell subparallel, instead of strongly divergent basally as in the preceding; ♀ with normal ovipositor, not exserted behind the apex of the abdomen dorsally. . . . . *Enicospilus*, Auct.

5. (2) Abdomen very elongate, and slender in lateral aspect, the 5th segment, so viewed, being strongly elongate.

   (Cheeks very short, the eyes nearly reaching the mandibles, the ocelli large, the rims of the outer ones almost touching the eyes, radius conspicuously thickened basally, with distinct glabrous area beneath, transverse median and basal nervures usually meeting in front wings, sometimes a little separated; propodeum declivous from the front margin or almost so, widely flattened or slightly impressed almost from base to apex, and with no transverse carina.)

   Eremotyloides, g. nov.

6. (1) Transverse median nervure in the hind-wings angulated near to or above or not greatly below the middle, never at $\frac{2}{3}$ of the distance from its upper extremity to the lower.

7. (10) Ocelli large or moderately large, the lateral ones never more distant from the nearest point of the eye-margins than the length of the ocellar diameter; cheeks between the eyes and mandibles very short inwardly.

8. (9) ♀ of normal Ophionine shape and structure, the ovipositor and sheaths not exserted behind the abdomen; hind part of the thorax in dorsal aspect with the sides only slightly rounded. . . . . *Athyreodon*, Ashm.

9. (8) ♀ with the ovipositor and sheaths extended far behind the tip of the abdomen; hind part of the thorax strongly rounded at the sides owing to the convexity of the metapleura. . . . . *Pycnophion*, Ashm.

10. (7) Ocelli placed medially on the vertex, the outer ones far removed from the eye-margins; cheeks extremely long, the eyes far removed from the mandibular articulation; abdomen unusually short and wide.

    Banchogastra, Ashm.

Ashmead characterised the endemic Hawaiian genera in his "Classification of the Ichneumon Flies," but his table of genera (pp. 86, 87) is very faulty, though the genera are perfectly valid. His figures in the "Fauna Hawaiiensis" do not always agree with his descriptions and are certainly incorrect in details.

Excluding *Pleuroneurophion*, he divides the genera according to whether the "transverse median nervure in hind-wings is broken above the middle" or "at or above the middle," the "above" in the latter case being clearly a *lapsus* for *below*.

Athyreodon belongs to the former division, but on examining a dozen Hawaiian specimens I find that in four this nervure is angulated at the middle, in four a little above the middle and in one only greatly above the middle, as he has figured it.

In the other division in *Pycnophion* the transverse median nervure is said to be "angularly broken at or near the middle but is figured as angulated far below the middle; *Banchogastra* as broken "much below the middle" but it is figured as being angulated much nearer the middle than in *Pycnophion* and the angle is not "a right angle." Of the specimens of *Banchogastra* that I have examined, the transverse median is angulated in one example at about the middle, in the others well below this, but always before the lower third of its length.

Pycnophion is said to have the ovipositor as long as the body and the propodeum with a transverse carina, but one of the species is described as without a carina, and with a much shorter ovipositor. Similarly *Eremotylus* is placed under the genera with "one or two transverse carinae" on the propodeum, while his Hawaiian species has none.

His use of very slight differences in the position of the extremity of the first recurrent nervure with regard to the "discoidal" nervure for defining the genera is worthless. It is not often a constant character in the genera under consideration nor even a reliable specific character in some species.

In the mass of Hawaiian material that I have examined in *Pleuroneurophion, Enicospilus* and *Eremotylus* the transverse median nervure is always angulated lower down than in any of the other genera, and to this extent the point of angulation is useful, especially as the genera named, excepting one remarkable species of *Enicospilus*, all have a glabrous area beneath the basal part of the generally thickened radius, which area is wanting in the others.

Whether the Hawaiian *Athyreodon* is congeneric with the type species (which had only a MS. specific name) must remain doubtful, until more important characters than those given by Ashmead have been examined. *Pleuroneurophion* is clearly related to some of the Hawaiian *Enicospilus* and not to *Ophion*. Morley in his table of Ophionines places *Ophion* and *Enicospilus* next to one another as having the "nervellus intercepted below centre,"

etc., though in all the species of the former that I have seen the angulation of the transverse median nervure of the hind-wings is in an entirely different position from that of *Enicospilus*. In the figure by Mr. Rupert Stenton in Morley's work the angulation is figured as being far *above* the middle.

The variability of many of the Hawaiian Ophionini is so excessive, that if similar variation occurs in other tropical countries, the group may well prove one of the most difficult of entomological studies. In *Enicospilus* these variations have to some extent been alluded to in the table of species and for the tribe, as represented in Hawaii they may be classed as follows :—

(1) Size extremely variable, so that smaller individuals of a species (of course of the same sex) may be from $\frac{1}{3}$ to $\frac{1}{2}$ the size of the largest. This variability occurs in species of *Enicospilus*, *Athyreodon* and *Eremotyloides* and possibly in other genera.

(2) Colour often very variable, so much so that possibly nearly black forms of all the ferruginous *Enicospilus* and ferruginous ones of those usually black may occur. It is possible that Ashmead's *E. mauicola* (*dimidiatus*, P.) is only a melanochroic form of *E. lineatus*, Cam. In fact the actual type of the former is of a somewhat intermediate character and does not agree with his description. Possibly *Eremotyloides orbitalis* may also have a pale form as in some examples the thorax is red and all the legs pale, while others are blackish-fuscous insects with dark legs, intermediates occurring.

(3) Neuration very variable in detail, even in points considered of importance (though much overrated in this respect, both in parasitic and aculeate Hymenoptera). This variation is sufficiently alluded to above.

(4) Chitinous thickened spots of the front-wings very variable in some species, well-developed in some examples of a single species or totally absent or in all stages of degeneration in other specimens. The glabrous area itself is more constant in its character.

(5) Sculpture variable in many species, especially the propodeal transverse carina. Sometimes this is normally present in one sex, absent in the other, but examples of these are found in which the conditions are reversed. In other cases the carina may be seen in all stages of obsolescence, from strong and complete to total absence.

(6) Dorsal fovea of 1st abdominal segment very variable, obsolete

or distinct in examples of a single species, and varying in form.

Very useful and comparatively constant characters in some of the most difficult species are found in the shape of the head, length of the cheeks and of the antennae, and in the sculpture and form of the dorsal surface of the raised scutellum.

Cameron's typical specimens, now in the British Museum, need to be carefully relaxed and cleaned, two of them indeed are in a mutilated or fragmentary condition, and but for the fact that they are the types, all would be better discarded from a collection.

Pleuroneurophion ferrugineus, sp. nov.

Colour ferruginous (like normal *Enicospilus molokaiensis*) only the apical joints of the tarsi, mandibular teeth, etc., dark. Mesonotum not shining, hardly visibly sculptured, the scutellum with excessively minute surface rugulosity. Propodeum with short white hairs, finely rugulose, without a transverse carina. Neuration dark, wings with yellowish tinge. Size of *P. hawaiiensis*.

Hab. Maui, Haleakala. Probably common, as it would be overlooked for the excessively abundant *Enicospilus molokaiensis* by any one not wanting the latter.

The following is a list of all the Hawaiian species of *Enicospilus* as here described, with synonymy and localities, as at present known. I am only able to use the localities given by Ashmead when I have seen the actual specimens. No doubt many of the species either in typical form or as slight varieties have a wider distribution than that given.

1. *E. molokaiensis*, Ashm. Common on all the islands.
2. *E. melanochromus*, sp. nov. Maui.
3. *E. kaalae*, Ashm. Kauai and Oahu.
   (=*semirufus*, Perkins.)
4. *E. longicornis*, Ashm. Hawaii.
5. *E. tyrannus*, Perkins. Molokai.
6. *E. nigrolineatus*, Ashm. All the islands.
7. *E. variegatus*, Ashm. Hawaii.
8. *E. bellator*, Perkins. Hawaii, Molokai and Oahu and probably the other islands.
9. *E. funereus*, sp. nov. Maui.
10. *E. waimeae*, Ashm. Kauai and (sec. Ashmead) Hawaii.

11. *E. mauicola*, Ashm. Hawaii, Oahu and probably other islands.
(=*dimidiatus* and *capnodes*. Perkins.)
12. *E. lineatus*, Cam. Hawaii, Maui, Lanai, Oahu.
(=*henshawi*, Ashm.)
13. *E. ashmeadi*, sp. nov. Hawaii.
14. *E. dispilus*, Perkins. Kauai, Oahu.
15. *E. castaneus*, Ashm. Hawaii, Molokai, Lanai.
(=*nigricans*, Cam., nec Ruthe = *nigritulus*. Morley.)
16. *E. pseudonymus*, sp. nov. Maui.

The Bibliography (so far as it is of any importance) concerning the Hawaiian Ophionini is not extensive.

1883. Cameron, Tr. Ent. Soc. 1883, pp. 192, 193.
Ophion lineatus and *nigricans* described.
1900. Ashmead, Proc. U.S. Nat. Mus., xxiii, pp. 86–87.
Pleuroneurophion, n. gen., *Banchogastra*, n. g., *Pycnophion*, n. gen., *Athyreodon*, n. gen., *Enicospilus*, *Ophion* and *Eremotylus*.
1901. Ashmead, "Fauna Hawaiiensis," I, pp. 341–350.
Ophion nigricans, Cam., and *lineatus*. Cam., pp. 341 and 342; *Pleuroneurophion hawaiiensis*, sp. n., p. 342; *Athyreodon hawaiiensis*, sp. n., p. 343; *Banchogastra nigra*, sp. n., p. 343; *Pycnophion kauaiensis* and *molokaiensis*, spp. n., p. 344; *Eremotylus orbitalis*, sp. nov., p. 345; *Enicospilus mauicola* and *kaalae*, spp. n., p. 347; *E. waimeae*, *variegatus* and *nigrolineatus*, spp. n., p. 348; *E. castaneus*, *henshawi*, and *molokaiensis*, spp. n., p. 349; *E. longicornis*, sp. n., p. 350.
1902. Perkins, Tr. Ent. Soc. London, pp. 141–143.
Abanchogastra, gen. nov., *debilis*, sp. nov., p. 141; *Enicospilus semirufus*, sp. n., p. 142; *dispilus* and *dimidiatus*, spp. n., p. 143.
1910. Perkins, "Fauna Hawaiiensis," II, pp. 678–680.
Enicospilus kaalae, Ashm. (*semirufus*, P. a synonym) and *E. tyrannus*, sp. n., p. 57; *E. capnodes*, sp. n., p. 679; *Athyreodon*, Ashm. (*Abanchogastra*, P. a synonym of), p. 679; *Banchogastra vitreipennis* and *Pycnophion fuscipennis*, spp. n., p. 680. (Written a few years before publication.)

1912. Morley, "Revision of Ichneumonidae," Pt. I, Ophionides and Metopiides. A British Museum Publication.

Henicospilus, *dispilus*, P., *lineatus*, Cam., *dimidiatus*, P., *semirufus*, P., included in table of Australasian species, pp. 48, 49. *H. lineatus*, Cam., p. 52. *Ophion nigritulus*, n. nom., for *O. nigricans*, Cam.

1913. Perkins, "Fauna Hawaiiensis," Introduction to, pp. cix, cx.

General remarks on Hawaiian Ophioninae (written three or four years before publication).

XX. *Descriptions of two new genera, and new species of* Mymaridae *from Tasmania.* By Chas. O. Waterhouse, I.S.O., F.E.S., *with illustrations from photographs* by F. Enock, F.L.S., F.E.S.

[Read November 18th, 1914.]

Plates XCII.

The specimens which are the subject of this paper were collected on Mount Wellington, South Tasmania, in the spring of last year by Mr. R. E. Turner. They were found at the high altitude of 2,300 feet. Although there are only eight specimens, there are four species which are divided between two new genera. The one for which I propose the name *Selenaeus* is remarkable for the great length of the ovipositor, the projecting part of which is as long as the whole insect. The other three species are closely allied to the genus *Polynema*, but differ in having a very fine vein running for some distance close to the front margin of the wing; the thickened basal vein is slightly elongate, whereas it is punctiform in *Polynema*. The three species are of great interest as showing three degrees in the development of the vein. In one species the fine vein is distinctly emitted as a branch from the thick basal vein. In the second the fine vein is quite distinct, but it is separated from the thick vein by a slight interval. In the third species the vein is so fine and so close to the front margin that it is seen with difficulty. Fortunately of two of the species there are two specimens, so that one can feel quite certain that these differences are not individual peculiarities. The wings of the species are of different shapes. Mr. Turner thinks that these species may be associated with some Homopterous galls which were very abundant where they were taken.

Selenaeus, gen. nov.

Antennae eleven-jointed (including the club which consists of three joints), the third extremely short. Front wings ample, the front margin of the apical portion arched, the posterior margin rather straight; the vein linear, extending a little beyond the

level of the posterior dilatation. Abdomen subsessile, apparently compressed [not in good condition]. Ovipositor extremely long, the portion projecting beyond the apex of the abdomen as long as the whole insect. Legs slender, the tarsi four-jointed, the basal joint very long.

I think this genus may be placed near *Anaphes*, with which it agrees in having a very small third antennal joint, and in the general form of the wings. It differs in having eleven joints to the antennae and in having long slender legs and tarsi. The ovipositor is unlike that of any Mymarid known to me, and is much longer even than in *Eustochus*.

Selenaeus Turneri, sp. n.

♀. Pitchy black, the back part of the mesonotum brownish yellow. Head rather large. Antennae ·95 in length; the basal joint brown, finely rugose; the second joint brown; the third very small, subglobose, yellow; the fourth, fifth and sixth elongate, pale yellow; the seventh and eighth shorter and broader, brown; the club elliptical, distinctly three-jointed, brown. Front wings 1·35 × ·32 mm., hyaline, but all the margins slightly clouded with brownish yellow, and there is a distinct pale brown shade across the wing below the vein. The surface hairs are very fine, rather short, not very close together. The cilia are long, even those along the front margin, the longest ·2 m. The hind-wing slightly clouded with brownish yellow, not curved forward as in *Anaphes*, posterior cilia long, about 42 in number. Legs yellow, the claws fuscous; the hind tibiae very long, slightly swollen towards the apex; tarsi rather long, the basal joint not quite equal to the three following taken together. Ovipositor yellow (the sheaths light brown), its total length from base of abdomen to apex about 1·45 mm.

Length 1·1 mm.

Hab. S. Tasmania, Mount Wellington, 2,300 ft., March 22, 1913.

Palaeoneura, gen. nov.

General characters and appearance of *Polynema*. Antennae of female nine-jointed; the third, fourth, and fifth joints elongate, the club consisting of one joint. Front wings ample, the vein slightly elongate (less punctiform than in *Polynema*) emitting from its apex a fine vein (sometimes interrupted) which runs close to the front

margin and extends for some distance. Abdomen petiolate. Tarsi four-jointed, the basal joint very elongate.

The species for which I propose this new generic name may be regarded as a primitive *Polynema* in which the wing vein, although evanescent, is still present for a considerable length, the basal thickened portion is moreover longer than in typical *Polynema*. The build of the insects is somewhat different from that of the European *Polynema* owing to the thorax being less narrowed in front and behind.

Palaeoneura Turneri, sp. n.

♀. Black, shining, the petiole of the abdomen and the legs dark pitchy, the knees paler. The tibiae are paler than the femora. The front tarsi are pale pitchy with the apical joint very dark. The posterior tarsi have the first and second joints pitchy yellow, the third pale pitchy, the fourth very dark. The basal joint and half the second are together equal to the remaining joints. Antennae with the second joint pale pitchy below, the third, fourth and fifth joints elongate narrow, the sixth a trifle shorter and broader, the seventh much shorter, the eighth as long as the sixth, much widened in the middle, the club equal in length to the eighth, seventh and about half the sixth together. Front wings very broad 1·45 × ·55 mm., the apex rounded, the apical portion of the hind margin rather straight, and slightly oblique; the surface hairs very close, short and fine; the longest cilia ·16 m. The posterior wing with about 47 cilia to the hind margin.

Length 1·3 mm.

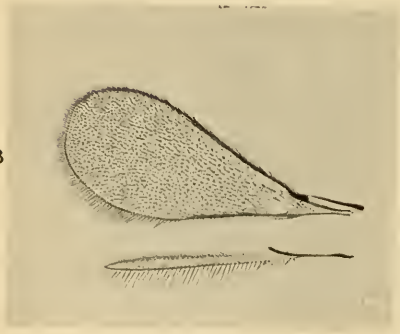
Hab. Tasmania, Mount Wellington, 2,300 ft., March 22 and April 6, 1913.

Palaeoneura interrupta, sp. n.

♀. Black, shining. Antennae with the second and third joints pitchy yellow, the second with its upper edge dark. The third joint very slender, a little longer than the second, the fourth and fifth much longer, the sixth and seventh each shorter, the eighth very short, ovate, the club and the eighth joint together equal to the seventh, sixth and fifth together. Front legs, except the base of the femora and apical joint of the tarsi, pitchy yellow, shaded in parts with light pitchy. Posterior legs dark pitchy, the knees and basal joint of the tarsi pitchy yellow; the second and third joints rather darker. The basal joint of the hind tarsi very long, a trifle

1

2



3

4

5

Photo, F. Enock.

NEW TASMANIAN MYMARIDAE.

longer than the remaining joints together. Front wings rather broad, the width greater than one-third of the length, 1·25 × ·375 mm. The surface hairs very short, close and fine. The longest cilia ·26 m., more than half the width of the wing. The vein with a short space between the thick basal part and the fine branch. Hind-wings with very few surface hairs, and with about 35 cilia on the hind margin. Petiole of abdomen pitchy yellow, dark at the base.

Length 1·3 mm.

Hab. Tasmania, Mount Wellington, 2,300 ft., March 21 and 25, 1913.

Palaeoneura evanescens, sp. n.

♀. Black, shining. Antennae with the second and third joints pale pitchy below. The third joint elongate, slender; the fourth and fifth a trifle longer and stouter; the fifth to eighth joints gradually shorter and stouter; the club comparatively small, about equal in length to the eighth and seventh together. Legs dark pitchy, the tibiae paler, the knees, apex of the tibiae and the basal joint of the tarsi pitchy yellow; the second and third joints a little darker, the apical joint very dark. The basal joint of the hind tarsi about equal to the second and third together. Front wings very broad, 1·4 × ·512, very obtusely rounded at the apex, the vein very fine and very close to the margin. Surface hairs very close, fine and very short. The longest cilia only ·075. Hind-wings with about 46 cilia on the hind margin.

Length 1·325 mm.

Hab. Tasmania, Mount Wellington, 2,300 ft., March 12 and April 6, 1913.

Explanation of Plate XCII.

Fig. 1. *Palaeoneura interrupta*, Waterh., type. × 30.
2. *Palaeoneura Turneri*, Waterh., type. × 30.
3. *Palaeoneura evanescens*, Waterh., type. × 30.
4. *Selenaeus Turneri*, Waterh., type. × 30.
5. ,, ,, , antenna greatly enlarged.

February 27th, 1915.

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CONTENTS OF PARTS III AND IV.

MEETINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON,

11 Chandos Street, Cavendish Square, W.

FOR THE

Session 1915–1916.

Wednesday, March	... ...	3
,, ,,	... ...	17
,, April	... ...	7
,, May	... ...	5
,, June	... ...	2

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OF

LONDON

FOR THE YEAR

1914.

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,, ,, 1893—1897 ...	6 17 6	4 12 0	3 11 0
,, ,, 1898—1902 ...	8 7 0	7 5 0	5 9 9
,, ,, 1903	2 2 6	2 2 6	1 11 10
,, ,, 1904	2 11 6	2 11 6	1 18 4
,, ,, 1905	1 10 0	1 10 0	1 3 0
,, ,, 1906	2 3 0	2 3 0	1 12 6
,, ,, 1907	1 18 6	1 18 6	1 9 0
,, ,, 1908	2 5 0	2 5 0	1 13 8
,, ,, 1909	1 12 0	1 12 0	1 4 0
,, ,, 1910	2 16 6	2 16 6	2 2 6
,, ,, 1911	3 4 0	3 4 0	2 8 0
,, ,, 1912	3 15 0	3 15 0	2 16 3
,, ,, 1913, Part I	0 12 6	0 12 6	0 9 6
,, ,, 1913, Part II	0 13 6	0 13 6	0 10 3
,, ,, 1913, Part III	0 10 0	0 10 0	0 7 6
,, ,, 1913, Part IV	0 12 0	0 12 0	0 9 0
,, ,, 1913, Part V	0 5 0	0 5 0	0 3 9
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THE

PROCEEDINGS

OF THE

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FOR THE YEAR

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1914-1915.

THE

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1914.

Wednesday, February 4th, 1914.

Mr. G. T. BETHUNE-BAKER, President, in the Chair.

Election of Fellows.

Miss MAUDE LINA WEST CLEGHORN, F.L.S., 57 Ballygunge Circular Road, Calcutta; and Mr. WILLIAM JOHN FORSHAM, M.R.C.S., L.R.C.P., The Villa, Bubwith, Selby, Yorks., were elected Fellows of the Society.

Appointment of Vice-Presidents.

The President announced that he had nominated Dr. H. ELTRINGHAM, the Hon. N. CHARLES ROTHSCHILD, and the Rev. G. WHEELER as Vice-Presidents for the present Session.

Exhibitions.

PRODENIA LITTORALIS BRED IN ENGLAND.—Mr. B. H. SMITH exhibited, on behalf of Mr. Forsyth of Weymouth, specimens of *Prodenia littoralis* bred by the latter from larvae found feeding on bananas there.

Prof. POULTON observed that it had been bred on Bugalla Island by Dr. Carpenter.

Commander Walker said that in the Pacific Islands it fed on tobacco amongst other plants, and Mr. E. E. Green observed that the same species had occurred as a troublesome pest in tobacco-curing sheds in Ceylon, but that a remedy had been found in turning turkeys into the infected sheds; he added that the larvae also eat ferns.

A Species of Protura and a New Order of Insects.—Mr. C. B. Williams exhibited a specimen of the Genus *Acerentomon* of the Order *Protura* taken from moss in the New Forest, Hampshire. He also drew the attention of the Society to the new Order *Zoraptera* just described by Silvestri, the first discoverer of the *Protura*, and said that Mr. Green's name was mentioned in connection with the discovery of the new Order.

Mr. E. E. Green said that he had found the insects in question in the hills of Ceylon, associated with Termites, in decayed wood. Of the original material, nothing remained but a slide consisting of two or three examples mounted in Canada Balsam, a tube containing material in alcohol having completely disappeared. Dr. Silvestri has now recorded and described two other species of the same Order—from Western Africa and Java respectively.

Ant Larvae as Sewing-Machines.—Mr. Donisthorpe exhibited specimens of the ants *Oecophylla smaragdina*, F., from Ceylon, and *O. virescens*, F., from North Queensland. These ants use their larvae to spin threads and fasten the leaves of their nests together, and the Australian specimens exhibited each held a larva in their mandibles, having been killed when using the latter to construct the nest.

Prof. Poulton said that the same fact had been observed by Mr. Lamborn in the same genus of Ants in W. Africa.

An exhibition illustrating the natural history of certain Algerian Diptera.—Prof. Poulton exhibited a collection of Diptera and other insects associated with them, made by Dr. Adalbert Seitz, F.E.S. The specimens were chiefly taken at Batna (about 1300 metres) in July 1913, and were accompanied by an interesting series of notes on the habits. These had been, as far as possible, epitomised on the labels. The Diptera had been kindly named by Mr. E. E.

Austen and some of the other insects by Mr. N. D. Riley and Mr. G. Meade Waldo. Dr. Seitz had sent the following interesting record of observations :—

Asilus barbarus, L., and its model, a small female of *Salius barbarus*, F.—" This Asilid I failed to catch with its prey. It does not appear before July, and flies in dry places and settles only on sandy ground. The model, which is found flying in the same localities, is I think nearly allied to the American *Pepsis*, which supplies the commonest models for insects of all Orders. I unfortunately only secured a very small specimen—as a matter of fact the smallest I have seen—of the Fossor, which is shy and difficult to catch. The model is generally of about the same size as the Asilid.

" So far as I remember, the Asilid has the habits and flight of our *Asilus crabroniformis*, L., but it does not make the *sound* of this European fly. *Crabroniformis* in its flight makes exactly the same sound as the common *Vespa crabro*, L.,—a *very much deeper hum than that made by other large Asilids*. I suppose that this deep sound is also a form of mimicry, just as it is in *Trochilium apiforme*, L., which also makes the sound of *Vespa crabro*. This is very easy to hear when the captured insect is humming in the butterfly-net. Another point of resemblance between *barbarus* and *crabroniformis* is the fact that both appear later in the year than any of their allies. Thus *barbarus* does not fly before July in Algeria, and *crabroniformis*, near Darmstadt, not before the end of August, becoming commoner in September."

Heligmoneura brunnipes, F. (*Asilus castanipes*, Meigen), and *Stenopogon heteroneurus*, Macq. (*Dasypogoninae*) and other *Asilidae*.—Dr. Seitz records that both these large Asilids begin to fly at the end of June (May in Proc. 1913, p. xliv). In addition to the butterflies mentioned by him (in Proc. Ent. Soc., 1913, p. xlix) as the prey of the first-named species, *P. rapae*, L., is now recorded together with nearly all the *Satyrinae* flying in June and July. Dr. Seitz also observed the female of the latter species devouring its own male, having pierced it from the side. " The specimen exhibited to the meeting was still alive when in my net but evidently quite disabled and only moving the tarsi. Against

the poison of these large Asilids other Asilids are not much more resistant than flies of other families. There is in the series of Asilids and their prey now sent a male of *H. brunnipes* together with its victim an *Anthrax*, but the captor was itself transfixed by another large Asilid, I believe *S. heteroneurus*, which escaped. I once saw one of these large Asilids rolling on the ground struggling with *Selidopogon* (*Dasypogon*) *crassus*, Macq. I did not catch them, but waited to see the end of the struggle. After some seconds both flew away apparently unharmed.

" I have observed that the prey of these flies is not the same in every year nor in every month. In 1904 at the end of June and during July I noticed that all the Algerian fields were covered with millions of a *Cicada*. I have never seen such swarms since that year. At the time of which I speak there was hardly an Asilid to be seen without a *Cicada* on his proboscis. Last year, 1913, was on the contrary a butterfly year : until July, Cicadas were rare and Asilids were commonly seen with butterfly prey. After the beginning of July a small species of *Cicada* became abundant, and were the usual victims of the *Asilidae*. Three examples are now sent, one captured by the male and one by the female of *S. heteroneurus*, one by the male of a species of *Asilinae*."

Prof. Poulton said that the 3 Cicadas were all males—a new species of *Adeniana* (*Tibicininae*), recently described as *seitzi* by Mr. W. L. Distant (Ann. Mag. Nat. Hist., Jan. 1914, pp. 182–3). Dr. Seitz found that the hive-bee is the commonest prey of *Selidopogon crassus*, just as it is of *S. diadema* in Europe (Trans. Ent. Soc., 1906, pp. 331–5).

The following *Asilidae* and their prey, sent by Dr. Seitz, were exhibited to the meeting :—

Dasypogoninae. — *Stenopogon heteroneurus*, Macq. — The male and female with Cicadas (p. iv), and the female devouring its own male (p. iii).

Stenopogon, sp.—A male of an unidentified species with the male of *Coenonympha pamphilus*, f.g. *lyllus*, Esp.; a female of another species with a very small bee. The prey was lost—blown away by the wind.

Asilinae.—*Heligmoneura brunnipes*, F.—Four males with

the following prey—*Pyrameis cardui*, L.; female *Melanargia galathea*, f.g. *lucasi*, Rambur; *Eristalis tenax*, L.; a species of *Anthrax* (p. iv). Four females with male and female *Pararge megaera*, L.; *Sterrha sacraria*, L.; a female *Sarcophaga* (much greased).

The males of two unidentified species, one with a male *Sarcophaga* (much greased), the other with a Cicada (p. iv).

Hippobosca camelina, Leach.—Two specimens—one typical, the other the dark Algerian form named *dromedarina* by Speise. Dr. Seitz sends the note "Caught on my back. Very troublesome to horses. Alights flying on the back of the horse and then runs very quickly and in a direct line to the anus, where it rests."

Exoprosopa pygmalion, F.—"A curious effect is sometimes produced by this Anthracine—as if it were flying sideways."

Bombylius bohariensis, Lucas.—"This beautiful species flies in April and May, disappearing in June when the other *Bombylidae* become abundant."

Physegaster maculatus, Macq. A pair taken *in cop.*—Concerning this interesting Oncodid (Cyrtid) fly Dr. Seitz wrote :—"This fly is not common : it hovers in spider-holes under the ground. The female, when settled, looks somewhat like a spider. The head is nearly aborted, so that the thorax resembles the cephalothorax. The legs too are held like those of a spider. The male does not bear any such resemblance." Further observations on this species by Dr. Seitz will be found in Proc. Ent. Soc., 1913, pp. xlix–l.

W. A. Lamborn's further notes on the Driver Ants (Dorylus) of Southern Nigeria.—Prof. Poulton read some further notes received in letters from Mr. Lamborn, and exhibited the Diptera (all dated Dec. 10, 1913) referred to, which had been kindly determined by Mr. E. E. Austen.

The material of the genus *Zonochroa*, in the British Museum, was divided into a large number of species, but only three of these had been as yet determined, and these did not include any one of the three species sent by Mr. Lamborn. Mr. Austen had informed Prof. Poulton that nothing was known of the bionomics of *Zonochroa*, and therefore the following notes became of much interest.

Rhinia apicalis, Wied., the species sent by Mr. Lamborn or one closely allied to it, ranged from West Africa to Natal.

Prof. Poulton also exhibited the 7 examples of *Bengalia depressa*, Walk., which had been captured by Mr. Lamborn, Nov. 7, 1913, attacking the driver ants on the march. One of these specimens had been exhibited to the Society on December 3 (Proc. 1913, p. cxxv). Five of the *Bengalia* were accompanied by the pupae they were sucking, together with the 5 ants, from which they had been stolen. It was interesting to note that all 7 flies were females.

The workers of *Dorylus nigricans*, Illig., captured on Nov. 7, were divisible into 6 sizes although transitional forms were present. Calling No. 1 the largest and No. 6 the smallest, two of the ants from which pupae had been taken were No. 3, while the other three were No. 4. It therefore appeared probable that pupae were generally carried by workers of medium size.

" On December 10, my colleague, Mr. Farquharson, told me in the early morning that he had just passed a swarm of driver ants which he thought were possibly raiding a bees' nest, on account of a humming noise he had heard coming from under some fallen palms. He did not stay to make a close examination, being anxious for me to come at once. On going to investigate the matter, I found that the drivers were forming one of their temporary nests and were throwing up earthworks, piling the earth in cones, between which were funnel-shaped openings leading into the ground.

" Flying over the drivers were a number of Diptera from which came the humming sound.

" There were three kinds :—(1) *A*, much the most common fly, flew to and fro over the funnels, gradually extruding a white ovum which it dropped when no ants were by. If, as sometimes happened, ants menaced it, the fly flew off to another opening and let its egg fall there. Many of these eggs could be seen on the ground, and the drivers did not touch them or even examine them as far as I could see, but in the natural course of their work gradually covered them with earth."

[The material labelled *A* consisted of 6 females of the

genus *Zonochroa* (*Calliphorinae*). Of these six, 4 belonged to one species, 1 to a second, and 1 to a third.]

" (2) *B* [a single female of *Rhinia apicalis*, Wied. (*Calliphorinae*), or a species very close to it] oviposited very differently. It flew to and fro until it found a spot of recently piled up soft earth where no driver happened to be working. It then settled and forced its pointed abdomen into the earth, remaining without apparent movement for about half a second, but, as I found later, actually ovipositing. It then withdrew its abdomen, and, having rapidly shovelled earth into the hole with its hind legs, flew away and repeated the action elsewhere on the nest. On digging I found an ovum at each place.

" I took the fly, and, placing it in a glass tube containing earth from the nest, witnessed its oviposition several times more, and then, taking it out, again found its ova.

" (3) *C* [the female of a species of *Anthomyinae*, in a condition which prevented determination], of which one example only was obtained, hovered over one particular opening made by the ants in the ground and then let drop a number of eggs—as many as six—in rapid succession.

" I found no signs of carrion, excrement, vegetable refuse or other material in which so many Muscids oviposit, but on the contrary thought the soil particularly good and sweet.

" Mr. Farquharson has very kindly read this little account and confirms the observations.

" Dec. 23rd. A large scattered heap of earth has now been thrown up by the drivers, but I cannot find fly larvae in it. I will try and dig them out."

The following note was contained in a letter dated Jan. 14, 1914.

" Drivers are a scourge at times. I see that Prof. W. M. Wheeler gives instances of their attack on Vertebrata. I have known them raid a fowlhouse and kill a hen and her brood, and at Oni once an unfortunate guinea-pig, forgotten under the house, had its eyes eaten out and large holes bitten through the abdominal wall before any one saw what was happening, and more than once there we had to vacate the bungalow until the ants had formed up and cleared off. They approach

from several directions in columns, then scatter and forage, retiring subsequently in column formation again, and when they have once found food they always return again sooner or later, following the same paths as before.

"At the present time the plantation drivers, *Dorylus nigricans*, are lodged in the bed of a dried-up streamlet where they are busily engaged in killing and eating the crabs, large fellows with a body often the size of one's hand, which live in holes in the banks. They leave only the empty shell in the course of 24 hours' work."

The Pierine Neophasia terlooti, Behr., female, A new North American mimic of Danaida plexippus, L., (archippus, L.).—Prof. Poulton showed a male and female of *terlooti* from Arizona, sent to him by Dr. H. Skinner, of Philadelphia, who had called his attention to the resemblance of the female to the common *D. plexippus*. Dr. Skinner had stated that he had received an example of the female as a "little *Danais*." Prof. Poulton said that no one could doubt the reality of the mimetic resemblance when the tints of the upper side and exposed parts of the under side of *terlooti* were compared with the corresponding surfaces of the Danaine model. It was of great interest to recognise the existence of a new mimic—and especially of a Pierine mimic—in the temperate zone.

Dr. F. A. Dixey said, with reference to Prof. Poulton's interesting exhibit of *Neophasia menapia* and *N. terlooti*, that he had some years ago drawn attention to the remarkable mimetic female of the latter insect, though he was not in a position to show a specimen. His communication would be found in Proc. Ent. Soc. Lond., 1905, pp. xx and xxi, where, however, the date 1904 was twice over given in error for 1894. Many mistakes had been made in respect of *N. terlooti* female; and it was not till some time after its discovery that it was recognised as the female of a well-known species. When it was supposed to be an entirely new form, it was the subject of an amusing contest for priority between certain entomologists. One of these competitors named it *princetonia* in honour of his University, whose colours it displayed upon its wings. Some account of the rather unusual tactics

employed in this rivalry had been given by Dr. Skinner in the Ent. News, Philadelphia, 1900, p. 533. Dr. H. H. Behr, who had described the male more than forty years ago, was of opinion that the two species of *Neophasia* were congeneric with the curious Mexican butterfly *Eucheira socialis*, whose larvae made an elaborate common habitation, in which they underwent pupation. Dr. Dixey, however, could not avoid the suspicion that Behr had been misled into attributing a larval nest which was really that of *Eucheira* to *N. terlooti*, and there appeared to be no other reason for supposing the two forms to be closely related. He remembered that Dr. W. J. Holland, of Pittsburg, U.S.A., who was present at the meeting of the Entomological Society to which he had referred, agreed in this opinion.

Mr. Collin congratulated Prof. Poulton on having induced these entomologists to study the habits of the African Diptera; he commented on those exhibited, and expressed a doubt whether the three so-called species of *Zonochroa* were really separate.

Mr. Blair observed that the *Hippobosca* of the New Forest makes for the soft parts of the skin of horses. In answer to an inquiry whether the driver ants give out any scent, Mr. G. A. K. Marshall replied that they do so.

Mr. Donisthorpe also commented on the ants.

Papers.

The following papers were read :—

" On the egg-laying of *Trichiosoma* (*Tenthredinidae*)," by T. A. Chapman, M.D., F.Z.S., F.E.S.

" A remarkable new Genus and Species of Odonata of the Legion *Podagrion*, Sél., from N. Queensland," by Kenneth J. Morton, F.E.S.

" Lepidoptera-Heterocera from S.E. Brazil," by E. Dukinfield-Jones, F.Z.S., F.E.S.

" The Myrmecophilous *Aphides* of Britain," by Prof. F. V. Theobald, M.A., F.E.S.

Wednesday, March 4th, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the chair.

Election of Fellows.

Messrs. Wm. J. von Monté Pendlebury, Broadlands, Shrewsbury, and Keble College, Oxford; Robert Veitch, 7 Queen's Crescent, Edinburgh, and Francis Cardew Woodforde, B.A., Market Drayton, Salop, were elected Fellows of the Society.

Exhibitions.

Polymorphism in Ants.—Mr. H. Donisthorpe and Mr. W. C. Crawley exhibited a number of polymorphic forms in ants, illustrated by a chart, and read the following notes :—

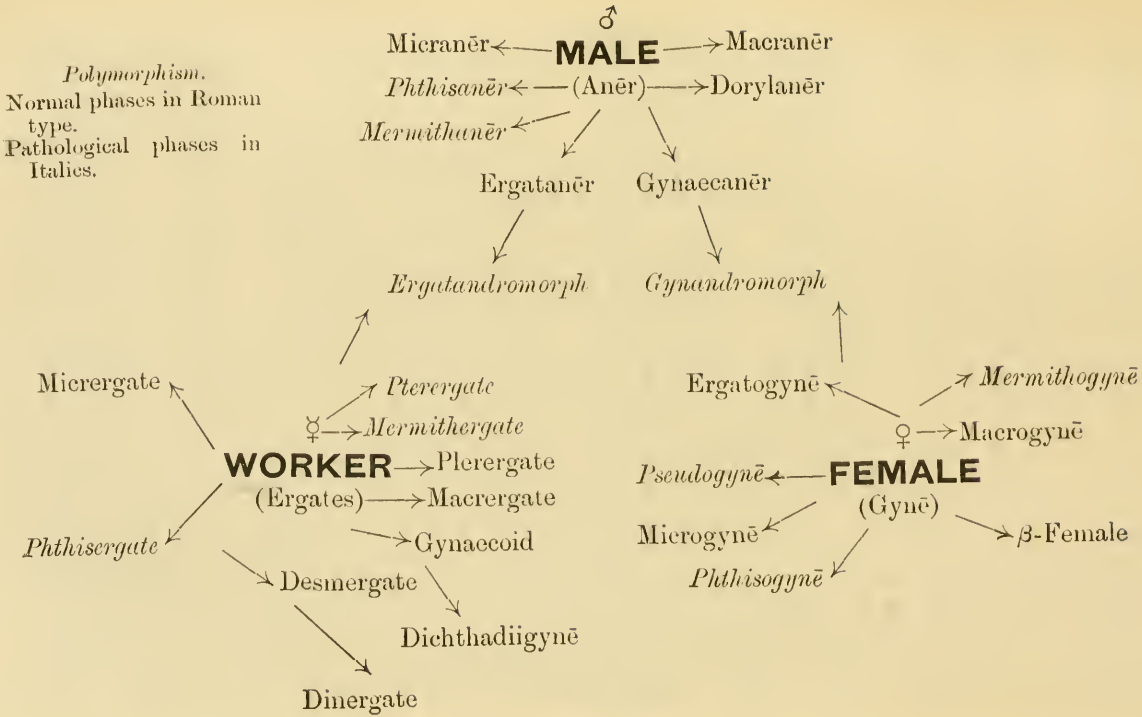
For our exhibit to-night we have selected one of the very many interesting problems presented by the study of myrmecology, namely Polymorphism in Ants.

For this purpose my colleague Mr. Crawley and I have constructed a chart, chiefly taken from Wheeler, with some additions of our own, to show all the different forms which occur in ants, and to illustrate this chart we have got together from our collections a number of specimens of most of the phases included in it.

The chief problem of polymorphism is to account for the various worker forms, and those such as the soldier, pseudogyne and ergatogyne, etc., which are intermediate between the worker and female. Weismann believes that the various castes are represented in the egg by corresponding units, fertilisation being the stimulus which calls the female determinants into activity, and meagre feeding the stimulus which arouses the worker producing determinants in the young larva from fertilised eggs. This is of course only a restatement of facts as far as they go.

Herbert Spencer thought that the female castes were not predetermined, but that they were brought about by differences in the feeding.

Emery seems to think that a worker-like wingless form was


Polymorphism.
Normal phases in Roman type.
Pathological phases in Italics.
♂
Micranēr
MALE
Macranēr
Phthisanēr
(Anēr)
Dorylanēr
Mermithanēr
Ergatanēr
Gynaecanēr
Ergatandromorph
Gynandromorph
Micrergate
Ergatogynē
Mermithogynē
Ptererga te
♀
Mermithergate
♀
Macrogynē
WORKER
Plerergate
(Ergates)
Macrergate
Pseudogynē
FEMALE
(Gynē)
Phthisergate
Gynaecoid
Microgynē
β-Female
Desmergate
Phthisogynē
Dichthadiigynē
Dinergate

the oldest type, but Escherich points out that it is unlikely that a wingless form which had once acquired wings, would again lose them, as in the case of wingless females.

The following appear to be the stages in the phylogeny of social insects :—

1. Pre-social stage with a single kind of ♂ and ♀.

2. Social stage with a single kind of ♂ and ♀, but the nesting and nursing instincts have developed.

3. Social stage with one kind of ♂ and two or more kinds of ♀, all fertile, but those that build and hunt for food are becoming less fertile.

4. The present stage with one kind of ♂, a fertile form of ♀, and one or more so-called "sterile" ♀♀ or ☿☿. These ☿☿ are fertile with sufficient frequency to maintain (principally through the ♂♂) a representation of their characters in the germ-plasm of the species.

Weismann considers the egg-laying of the ☿☿ as too infrequent to influence the germ-plasm of the species. But it is not so infrequent as he supposed, and not only ♂♂ but ☿☿ also are produced from these eggs; so there is no reason why the transmission of characters acquired by this caste should be more improbable in ants than in other animals.

It was supposed that unfertilised eggs always produced males, but the experiments of Mrs. Comstock, Reichenbach, Crawley, and recently my own, have shown that this is not always the case, and that unfertilised eggs laid by workers can produce workers, which considerably complicates matters.

One other point which requires explanation is the fact that true females are not reared in captivity, the only exception we know of being recorded by the late Lord Avebury.

I will not take up any more time now, but proceed with the explanation of part of our chart.

The *male* (*anēr*) is the most fixed of the three typical phases, even in genera where the females and workers are most different in allied species.

The *micranēr* is smaller in stature than the normal male.

The *phthisanēr* is a pupal male which in the larval or semi-pupal state has had its juices partially extracted by an *Orasema* larva, and is unable to pass on to the imaginal stage.

The *mermithanēr* is a male with short wings, caused by the presence of an internal worm of the genus *Mermis*.

The *ergatanēr* resembles the worker in possessing no wings, and in the structure of the antennae, etc. The ergatoid male probably inherits the worker character.

The *ergatandromorph* is an individual in which the male and worker characters are combined.

The *macranēr* is an unusually large form of male which occasionally occurs in populous nests.

The *dorylanēr* is the unusually large form peculiar to the Driver Ants (*Dorylus* and *Eciton*).

The *gynaecanēr* is a male which resembles a female rather than a worker (*Anergates*, *Epoecus*).

The *gynandromorph* is partly male and partly female.

The normal *female* (*gyne*), or *α-female*.

The *macrogyne* is an unusually large female, occurring, like the *macranēr*, in populous nests.

The *microgyne* is a dwarf female.

The *β-female* is an aberrant form, occurring either with or without the normal female, and characterised by excessive development in the legs, and in the pilosity of the body.

The *pseudogyne* is a worker-like female, with enlarged mesonotum, but without wings.*

The *phthisogyne* arises from a parasitised larva, and has been unable to reach the imaginal instar.

The *mermithogyne* is a female with small wings, caused by parasitization by a *Mermis*.

The *ergatogyne* is a worker-like female.

The *dichthadiigyne* is peculiar to the sub-family *Dorylinae*, it is wingless, possesses neither eyes, nor ocelli, and is probably a further development of the *gynaecoid* worker.

* Wasmann considers pseudogynes as almost useless in the colony, but we have found them to work, fight, and tend the young as do the ordinary ☿ s. Doubt is thrown on Wasmann's theory that these forms are caused by the presence of *Lomechusa* and *Atemeles* larvae in the colony by the discovery by Donisthorpe in Scotland of immense flourishing colonies of *Formia rufa* and *pratensis* containing hundreds of pseudogynes and without a trace of the parasitic larvae, and the same observer has found nests in Lundy Island containing the larvae, but with no pseudogynes. (W. C. Crawley).

The *worker* (*ergates*) is without wings, the thorax is simple, the eyes are small and the ocelli are often wanting.

The *pterergate* is a worker with vestiges of wings on a normal thorax.

The *micrergate* is a worker of unusually small size.

The *mermithergate* is an enlarged worker produced by the presence of an intestinal worm of the genus *Mermis*.

The *plerergate* is a worker which in the callow stage has acquired the habit of distending the gaster with honey.

The *phthisergate* is a pupal worker produced in a similar manner to the *phthisaner*.

The *macrergate* is an unusually large worker, often only produced in populous colonies.

The *gynaecoid* is an egg-laying worker. In some families the queen phase has disappeared, and has been replaced by a gynaecoid worker.

The *dinergate*, or soldier, is characterised by a huge head and mandibles, adapted for crushing seeds, fighting, etc.

The *desmergate* is an intermediate form between the *dinergate* and the normal worker.

Mr. Donisthorpe said that however well they had fed their ants, they had never succeeded in rearing females in captivity.

Prof. Poulton asked whether there was any difference between the workers and the males produced from eggs laid by workers and those produced from the eggs of normal females. Mr. Crawley replied that there was not. In answer to a question by the President as to the meaning of the expression "highly or slightly developed" applied to the genital armature of the male, Mr. Crawley replied that he only meant of large or small size.

Living Larvae and Imagines of Agriades thersites.—Dr. T. H. Chapman exhibited a ♂ and ♀ imago of *Agriades thersites*, alive, bred from the egg; also two last-stage larvae. He proposed to offer the Society at its next meeting a short paper with notes on the Life History of the species; this exhibit would have been more appropriate then, but the living material would then possibly not be available.

Gynandromorphic Eriogaster lanestris.—Mr. H. Main

exhibited a gynandromorphic specimen of *Eriogaster lanestris*, right side ♀, left side ♂, bred last year at Eastbourne by Mr. E. P. Sharp.

Rare Goliath-beetles.—Mr. O. E. Janson exhibited a specimen which he believed to be the female of *Goliathus wisei*, Heath, hitherto unknown, also specimens of *G. kirki*, Gray, in which the white markings were very perfectly preserved; all of these had been recently found by Dr. Baxter in Usagara, German East Africa.

British Eudectus and Oedemera virescens.—Mr. Champion exhibited, on behalf of Mr. E. W. Morse, of Leeds, the second British specimen of the genus *Eudectus*, probably a variety of *E. whitei*, Sharp, from Ingleborough, Yorks., and a pair of *Oedemera virescens*, L., from Symonds Yat, Hereford.

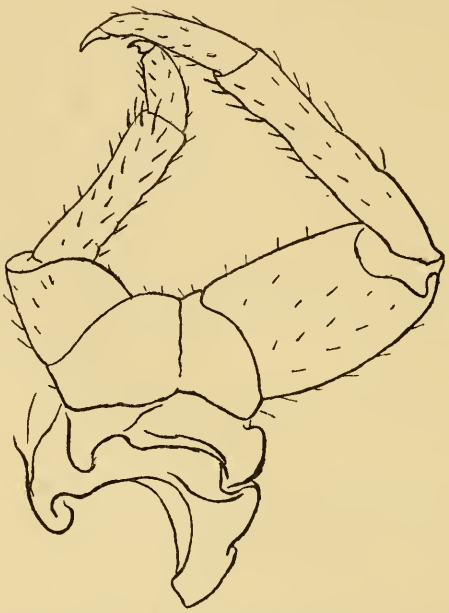
Suggested protective value of the Cocoon of Lyonetia clerkella, L.—Dr. F. A. Dixey exhibited, at the desire of Mr. J. C. Hawkshaw, F.E.S., a cocoon of *Lyonetia clerkella*, L., spun up on a cherry leaf. Mr. Hawkshaw suggested that the fine silken web attached to the leaf on each side of the supporting strands, and guy lines by means of which the cocoon is slung up like a hammock, served as a protection against ants. The webs are very loosely attached to the leaf, and when touched with a knife become, with the cocoon, a shapeless mass which sticks to the knife persistently. Before an ant could reach the cocoon, its head and antennae, Mr. Hawkshaw thinks, would become hopelessly entangled, and would carry the whole away on it.

Dr. Dixey thought that a possible objection to Mr. Hawkshaw's suggestion would be that another ant might come to the rescue of the first, and might succeed in grasping the cocoon in its jaws without getting entangled in the now collapsed silken web.

Mr. Donisthorpe considered that Dr. Dixey's suggestion as to the assistance of another ant was quite likely to be correct.

Dichotomy of Anterior Limb in a Coccid.—Mr. E. Ernest Green exhibited a Coccid with double anterior limb, and read the following note :—Many examples of Dichotomy of the limbs, antennae and other organs of insects have been

recorded, from time to time. Prof. Bateson's well-known work, "Material for the Study of Variation," reviewed all the scattered information on the subject and added a mass of fresh material which is now—I believe—preserved in the Museum of the Royal College of Surgeons. The phenomenon of dichotomy and multiplication of organs appears somewhat frequently in the Order *Coleoptera*, and instances have been noted in several other Orders. But I cannot recollect having



Anterior limb of Coccid (*Monophlebus crawfordi*) showing dichotomy. × 65.

seen or read of any such aberration in the Family *Coccidae*, and I am inclined to believe that the instance here described is unique.

The accompanying figure shows a case of dichotomy of the anterior limb of the large Australian Coccid—*Monophlebus crawfordi*, Maskell. The duplication, in this example, appears to arise from the trochanter. The supplementary limb, though somewhat malformed, is fully developed and shows the normal number of parts. The tarsus, tibia and femur are

all smaller than the respective parts in the normal limb; but the trochanter of that side is abnormally large. The coxa, which is common to the two members, is strangely distorted and plicated, suggesting that the dichotomy may have been induced by an injury to this part during the nymphal stage of the insect.

This aberrant specimen was found amongst material sent to me (for determination) by Mr. H. Donisthorpe, and was collected at Townsville, North Queensland, where the species occurs in the arboreal nests of an ant (*Cremastogaster* sp.).

Lasiocampa ilicifolia.—Mr. L. W. Newman exhibited a fine ♀ *Lasiocampa ilicifolia* taken on the wing at Cannock Chase, by Mr. G. B. Oliver on May 25, 1913. Mr. Newman stated that the larvae in captivity took readily to aspen.

A varietal form of Cidaria suffumata.—Mr. A. W. Mera exhibited two specimens of *Cidaria suffumata*, of an unusual form, from East Devon, received from Rev. J. W. Metcalfe, who takes this form in damp woods and finds it not entirely confined to one wood. The specimens were smaller and the wings appeared to be more rounded than in the type, suggesting the possibility of another species. Mr. Mera added that the time of appearance was May. Typical specimens from various localities were exhibited for comparison.

A surprising family of Hypolimnas (Euralia) dubia, Beauv., and anthedon, Dbl., from Natal.—Prof. Poulton stated that he had just received, from Mr. E. E. Platt, of Durban, the male and female parents—both of the *wahlbergi* form—caught *in coitu*, with their large family of about 200 *mima* and *wahlbergi* in about equal numbers. These results were quite unexpected, in view of the fact that the West Coast *anthedon* (corresponding to *wahlbergi*), was shown by Mr. W. A. Lamborn's families, to be recessive; so that a family entirely made up of *wahlbergi* was to be expected from the parents captured by Mr. Platt. Furthermore the equality of the two forms in the family suggested the pairing of a recessive with a heterozygote, and yet the two parents were alike; so that the heterozygote, on this hypothesis, bore the appearance of the recessive. It was of course possible that the female *wahlbergi* had previously paired, and that the last

pairing produced no effect; but this interpretation seemed rather strained. Mr. Platt's *Euralia* family was, so far as Prof. Poulton was aware, the only one in which both parents were known. In all other examples the form of the male was an inference. Prof. Poulton hoped to show the parents and the whole family as soon as the specimens were set up and labelled.

Paper.

The following paper was read :—

"A Revision of the Central American *Chauliognathinae* (Fam. *Telephoridae*), based on the Genital Armature of the Males," by G. C. Champion, A.L.S., F.Z.S., F.E.S.

Wednesday, March 18th, 1914.

The Rev. George Wheeler, M.A., F.Z.S., Vice-President, in the chair.

Election of Fellows.

The following gentlemen were elected Fellows of the Society :—Messrs. P. R. Awati, Imperial College of Science, South Kensington; Rosse Butterfield, Curator of the Corporation Museum, Keighley, Yorks.; Robert Neill Chrystal, B.Sc., 9 Braid Avenue, Edinburgh; E. J. Godfrey, The Education Dept., Bangkok, Siam; H. Baldwin Hudson, The Ferns, Upper Highway, King's Langley, Herts.; John Russell Mallock, Office of the State Entomologist, Urbana, Illinois, U.S.A.; J. R. de la Torre Bueno, 14 Dasenbury Place, White Plains, New York, U.S.A.; Morris N. Watt, St. John's Hill, Wanganui, New Zealand.

Exhibitions.

Nest of Lasius fuliginosus.—Mr. Donisthorpe exhibited a large nest of *Lasius fuliginosus*, Latr., dug up at Oxshott on September 9th, 1913, which was situated under the roots of a large Scots Fir. It was made of carton constructed of bits of chewed wood and bark mixed with earth,

and bound together with the secretion of the maxillary glands of the ants, and contains a large amount of fungus. The fungus was named *Septosporium myrmecophilum* by Fresenius, but Lagerheim thinks it is *Cladotrichum microsporum*, Saccardo. The hyphae of the fungus are said to be devoured by the ants' larvae (the whole of the surface of the walls being covered with a delicate bloom), and the mycelium helps to strengthen the carton walls. As this fungus is only found in the nest, and as no other species occurs in the nest, it is probable that the ants intentionally cultivate it. It was thought that only *L. fuliginosus*, Latr., and *Liometopum microcephalum*, Pz., made carton in Europe, but recently Wasmann has shown that *Lasius emarginatus*, Oliv., and I that *L. umbratus*, Nyl., also do so.

The nests of *L. fuliginosus* are found in the earth, at the roots of trees, in hollow trees and logs, under the floors of houses, etc. Oudemans found a nest in a turf-cellar, and Zimmer found a nest in a child's coffin which had been buried for about thirty-eight years, the whole of the coffin being filled with carton. The colour of the carton is lighter or darker according to the amount of soil mixed with it.

Huber thought these nests were carved out of wood, but Meinert and then Forel proved them to be made of carton.

The Rev. F. D. Morice said that when it was supposed that the nests were carved out of the wood, the dark colour was supposed to be due to a secretion of the ants. Mr. Donisthorpe said that it was due to the amount of soil mixed with it, but that no doubt the acid secretion of the ants does produce a dark stain also. Mr. E. E. Green said that these ants left a dark stain across a light-coloured path in his garden, as termites do, but that it might possibly have been the effect of "honey-dew," as the ants had been feeding on aphides. In answer to Prof. Poulton he said that doubtless the tracks were elsewhere also, but were only readily visible on the path. Dr. Chapman suggested that this fungus, like some others, might become black when dead. Mr. Donisthorpe added that larvae of this species had hardly grown in three years in a nest of Mr. Crawley's, and suggested that this might be due to want of this fungus as an article of food.

Rare variety of Cassida rubiginosa, Müll.—Mr. C. J. Gahan exhibited on behalf of Mr. W. West a remarkable and very rare variety of *Cassida rubiginosa*, Müll. (= *viridis*, Fab.), the occurrence of which in this country had not, so far as he knew, been hitherto recorded. One specimen of the variety had been taken by Mr. West in Greenwich Marshes in 1876, along with several specimens of the typical form. It is stated by Weise, who described it as var. *fuliginosa*, to be very rare on the Continent.

Western American Wasp's nest.—Mr. A. E. Tonge exhibited a nest and imagines of *Vespa maculata* taken in a church porch at Redlands, California, in April 1913.

Living larvae of Argynnis aglaia.—Mr. E. C. Joy exhibited larvae of *A. aglaia* which had just come out from hibernation. The ova were deposited in moss early in August last year, and the larvae, on hatching, went as usual into hibernation immediately, without feeding. They wintered among the moss which was placed in a small bell-jar with damp sand at the bottom; this was removed to a partially sheltered situation in the garden. On Saturday, March 14th, after lightly spraying the moss he had brought the larvae into a warm room, and within a couple of hours they were wandering about on the sides of the glass jar, and had since begun to feed sparingly on young violet. About 80 per cent. seemed to have survived the winter.

An expedition to the Sarstoon river.—Mr. A. E. Gibbs exhibited a number of Lepidoptera from British Honduras, and read the following notes :—

In September 1913, Dr. F. L. Davis, one of our Fellows, who is resident in Belize, British Honduras, arranged a collecting expedition to a village inhabited only by half-civilised Indians and known as San Pedro, on the Sarstoon river, some fifty or sixty miles from the dangerous bar at the river's mouth. The Sarstoon forms the boundary between our colony and the Republic of Guatemala. The trip, however, was not so successful as he anticipated, and particularly was he disappointed at the absence of Syntomid moths, for which he kept a special look-out, and which, it will be remembered, he was so successful in finding last year when he took a holiday

to Castile on the Old River. San Pedro does not appear to be such an entomological paradise as Dr. Davis fondly hoped, but he found a number of very interesting species and has sent home some useful notes about them. On his journey Dr. Davis noticed that the river twisted and turned about a great deal, sometimes due east and again due west and all variations between these points, but the general direction was more or less north-west. The weather proved about as bad as it could be, with heavy showers every day, and every night terrific thunderstorms with torrents of rain. This made the jungle paths so full of mud and water that Dr. Davis and his companion were all the time walking well over their ankles in that unpleasant mixture, varied occasionally by having to cross small streams which took them up to the knees. They walked for hours through these paths and explored all of them, but with very poor results. Collecting under such circumstances is, of course, far from pleasant, and the doctor had to put up with many discomforts and attacks from insects, which resulted in an illness after his return to Belize, which kept him in bed for three weeks. He made his temporary headquarters in an old wooden store-room, built on posts ten feet from the ground. This was situated on the river bank, close to where he landed and about a mile from San Pedro. He found many of the commoner butterflies of the neighbourhood at this place, but very few—only four—species that were new to him. At the landing-place *Papilio marchandi* was found, not uncommonly, on the muddy bank by the river, and in company with it were *Papilio thoas* and *P. androgeus,* these two much more commonly, and *P. macrosilaus,* rare, with countless hundreds of *Callidryas philea, C. argante,* etc. The *Papilios* were very wary and could only be captured with great difficulty. Dr. Davis found, towards the end of his stay, that it was a good plan to put a broken specimen on a part of the mud that could be conveniently reached and then to lay in wait for them till they came to inspect it. He writes: "In this way I did better, and I wish I had thought of the plan sooner. There was a big mud pool right in front of our quarters which also attracted these *Papilios,* but I found them very shy and quick to take to the

wing. The river banks at the landing-places for boats always seem to be the best for *Papilios*."

Among the specimens Dr. Davis sent me were two, male and female, of *Terias nicippe*, a well-known Mexican insect. Only four specimens in all were seen, and they were flying on the open savannah. Although *T. nicippe* ranges as far south as Guatemala, this is apparently the first record for British Honduras. Dr. Davis has not previously met with it in the colony, nor have I received it in the consignments sent home by my collector. *T. euterpe*, Ménét. (*lisa*, Boisd.), was taken in considerable numbers, and Dr. Davis observed the female depositing eggs on a "sensitive plant."

I have put in the drawer specimens of all the Papilios and Pierids I received from Dr. Davis, taken on this journey, and also some insects belonging to other Families.

Early stages of Caligo memnon.—In the drawer is a specimen of *Caligo memnon*, an insect which appears to be rather common in British Honduras. My collector writes me that he watched a female ovipositing. The eggs were laid on canna, and he secured eight of them, which he took home, and in about eight days the young larvae emerged. They took about two months to reach maturity, and when fully grown were pale yellow-green, with a brown spot in the centre of the back. Their length before pupating was approximately five inches and they were about as thick as an ordinary lead pencil, tapering at each end. They had two processes, which he calls "horns," at the back of the head, about one-fourth of an inch long, with two smaller ones behind them. When touched or otherwise irritated the larvae would throw their heads from side to side as though threatening an attack with their "horns." He describes the posterior end of the larva as having two "horns" which pointed backwards, each point inclined a little to one side. The young larvae made cuts in the edge of the leaf and rolled the piece thus freed into a case in which they remained concealed during the daytime. When they got bigger they hid either in these cases or in the hollows of the stems. He has found the caterpillars on canna, wild canna and banana. When fully fed the larva attaches itself by the anal extremity

to the top of the cage, or to the food-plant, by a thin web, and remains suspended for about three days before the larval skin is thrown off. This is accomplished by what he calls a "writhing movement," which causes the skin to split, the rent gradually extending until in about half an hour it is got rid of. The chrysalis is of a bright green colour, and in its dangling position resembles the seed-pod of a plant. He tells me that its shape is difficult to describe, being angled at the head and rounded at the other extremity, and it has an indented "waist." The pupal stage lasts about three weeks. So far as I can learn nothing has hitherto been written about the early stages of *Caligo memnon* though the transformations of other species of the same genus have been observed, and Mr. Kaye has published in our Transactions for 1904 some useful sketches and a short note by Mr. J. Guppy of the larva of *C. ilioneus f. saltus*, Kaye. I thought, therefore, these observations, although not written in scientific language and made by a man with no entomological training, but who, nevertheless, appears to be an intelligent observer, might be worth putting on record. Those who have seen illustrations and read descriptions of the early stages of Caligos, whose history is known, will, I think, recognise that these notes, written in homely words, agree very well with previously published observations on other species belonging to the same genus. (Trs. Ent. Soc. Lond., 1904, p. 226, pl. xvii.)

Erotylid beetles occupying the empty clay cells of Aculeate Hymenoptera.—Prof. Poulton exhibited the two nearly hemispherical clay cells in which Mr. C. O. Farquharson had found the beetles *Episcaphula interrupta*, Lac., as recorded in these Proceedings, 1913, p. cxxii. Both cells were old and disused, and one contained two empty puparia, probably of parasitic Diptera. Both cells had been found on the same stump, and it appeared evident that the beetles had merely entered them, probably for hibernation or aestivation, as they might have done any other cavities.

Ants attendant on the larvae of the Lycaenid—Myrina silenus, F.—Prof. Poulton said that he had received the following notes from Mr. C. O. Farquharson :—

" *Moor Plantation, Ibadan, S. Nigeria,*
" *February 18th,* 1914.

" Just before Mr. Lamborn went away I brought in two larvae of *Myrina silenus*, and have been watching the attendant ants—a form of *Camponotus akwapimensis*, Mayr.,—at work on the gland. I have been comparing the behaviour of the larvae with that described, on p. 488 of the 1913 Trans. Ent. Soc., for *Cupido malathana*, Boisd., and have been greatly interested. I noticed that the tubercles do not apparently work with such great rapidity as in this latter species. For considerable intervals they were not out at all; then they would be thrust out somewhat slowly and deliberately. The ants in this case did not seem to mind them, but when the leg of an ant that was sucking the gland secretion happened to touch a tubercle accidentally, the latter was withdrawn with great rapidity. Both are not withdrawn simultaneously. It is curious to note, too, that when one ant is working on the gland, alternately tapping with its antennae and sucking the droplet as it appears, another ant or sometimes two would go on tapping the larva at other parts of the body, apparently with as great assiduity as if they were on the actual gland. To the credit of the lucky worker, be it said that it shared, by regurgitation, its meal with the others. For quite a long interval no amount of tapping the gland produced any visible effect, and during this time the tubercles were not inactive but were thrust out at intervals. The ants seemed in some perplexity, and three altogether vigorously tapped the larva but with no apparent result. The ants seem, after a short preliminary alarm, to have no objection to any one looking on with a low-power lens.

" *February 25th,* 1914.

" The ants went on tapping the Lycaenids after pupation had been completed."

The misleading resemblance between mimetic butterflies and their models.— Prof. Poulton exhibited examples from a small general collection of butterflies bequeathed, with the great British J. C. Dale Collection, to the Hope Department by Mr. C. W. Dale, and received in 1906. The South American *Papilioninae* were classified by pattern, as in all except the

most recently arranged series, and there was the usual mixture of species belonging to the three separate sections. A more interesting and instructive association—as shown in the specimens exhibited to the meeting—was that of model and mimic under the same species. Of two specimens labelled *Papilio ascanius*, Cram. ("*Pharmacophagus*" or "Aristolochia Swallowtails"), one was *P. lysithous* f. mim. *platydesma*, Rothsch. and Jord. ("*Cosmodesmus*" or "Kite Swallowtails"). Of three specimens labelled *P. agavus*, Drury ("*Pharmacophagus*"), one was *P. lysithous* f. mim. *lysithous*, Hübn., another form of the same "*Cosmodesmus*" modified by the mimicry of a second "*Pharmacophagus*" model with a pattern different from that of *ascanius*. Further evidence of the misleading likeness between model and mimic was afforded by the name *Papilio hippocoön*, F., given to the Danaine model *Amauris niavius*, L., of this mimetic female of *P. dardanus*, Brown. The *Amauris* exhibited to the meeting was a typical West African form. The unknown naturalist who was responsible for the arrangement of this little collection had thus, all unconsciously, provided a striking proof of the deceptive resemblance between models and mimics.

Some details in the relationship between the mimetic and the non-mimetic patterns of Papilio polytes, L.—Prof. Poulton exhibited examples of *Papilio polytes*, L., which confirmed the conclusion that the sub-marginal red spots on the hind-wing of the mimetic forms of female represent, and may be regarded as developed from, the sub-marginal red (in the spring broods) or pale spots (in the summer broods), found upon the under side and occasionally upon the upper side of the non-mimetic male, and commonly developed to an intermediate degree in the non-mimetic female. In the male a single spot in the series—namely that in area 3, below vein 4—was almost invariably smaller than any of the others, and was frequently absent altogether. A similar condition was shown to exist in the non-mimetic females, and also in the mimetic females, where, although the whole series was more largely developed, the spot in area 3 was generally smaller than any of the others. An interesting difference was to be observed between the two mimetic female forms common in

India and Ceylon. In the *polytes* female, mimicking *P. aristolochiae*, F., the sub-marginal spots were smaller, and exhibited, like those of the non-mimetic female (*cyrus*, F.), a far closer relationship to the condition of the non-mimetic male than that shown by the *romulus*, Cram., female (mimicking *P. hector*, L.). When, however, one of the spots of the *romulus* series was conspicuously smaller than the others, that spot was to be found in area 3. The comparison was illustrated by males, male-like females, and the mimetic forms of female of the subspecies *polytes*, from the eastern Asiatic mainland and of the subspecies *romulus*, from the western mainland and Ceylon.

Living Melöe proscarabaeus.—Mr. Champion exhibited two living examples of *Meloë proscarabaeus* found at Guildford on March 14th last, an unusually early date.

Insects from the Brünig Pass.—Mr. H. Main exhibited a large number of photographic slides taken during a holiday in Switzerland last summer, mostly illustrating insects found on the Brünig Pass. These included nests of *Vespa norvegica* and *Polistes gallica*, a number of instances of moths concealed among their surroundings, and complete life-histories of *Cicindela campestris* and *Myrmeleon formicarius*. Amongst the latter was an illustration of the manner of "forcibly feeding" the imago by holding the wings in a clip.

The feeding of captive butterflies.—Mr. C. F. M. Swynnerton exhibited a drawing of a similar method of feeding butterflies in captivity, and read the following notes :—

When I first attempted to breed from *Papilio dardanus* females I found quite a difficulty in obtaining eggs. I tried all possible food-plants—*Teclea*, *Toddalia*, orange, both wild and cultivated, and *Clausena*, on each of which plants I had seen unconfined individuals laying, also lemon and lime. Fearing my boxes were too small I made a bottomless cage, measuring nearly five feet in length and height and more than half as broad and placed it simultaneously over clumps of Zinnias and young plants, specially transplanted thither, of *Teclea*, etc., or over Zinnia clumps growing up against orange trees, branches of which were drawn into the cage. Yet entries of the following kind still described my results :—

" March 25th, 1911. Captured *P. hippocoön* and at once placed her in new breeding-cage. . . .

" March 27th. Feeble in morning . . . dead by noon. Has laid nothing.

" April 14th. Since the above was written no less than three gravid *P. hippocoön* have been placed in the cage and have died without laying.

" April 27th. And another since the above. To-day I captured a *hippocoön* laying on wild orange " (and placed her in the cage, drawing in wild orange branches). . . . " In the later afternoon I inserted three more, each as captured."

These, and others, died without laying.

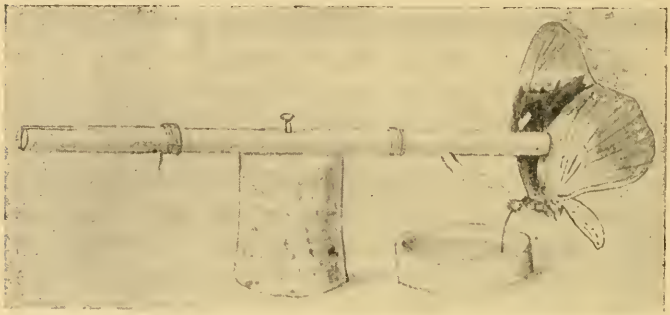
I could get none of my *dardanus* females to feed freely in captivity and all in consequence died very soon; but in view of the success of other breeders I doubted whether this was the real reason of my own non-success. However, on making my last attempt, in 1913, to breed the species, I tried holding the butterflies by the closed wings, between finger and thumb, over a saucer of sugar-water, at the same time uncurling the proboscis into the liquid by means of the point of a pin. Struggling ceased as a rule when the proboscis entered the liquid and the butterfly fed on the sugar-water as freely as a held *Charaxes* does on fruit.

I found feeding in this way a slow process, so, being unable to give the necessary time to it, I substituted for my fingers the simple " holder " of which I append a drawing. A straight-grained twig, a few inches long, was cut off neatly at the ends and pinned or nailed through its middle on to the end of an ordinary cork, this being cut to the required height and stood up on its other end to form a pedestal for the horizontally-laid twig. The two ends of the twig were each slit for some distance in, vertically, a thread or string being first wound round tightly between the intended slit and the cork in order to prevent the former from extending too far. The butterfly's wings were pushed, costa foremost, into the slit, preferably for a rather greater distance than I have shown in the drawing; a small vessel containing sugar-water was placed between the insect and the cork—or else the cork was put to stand in a saucer containing a little of the liquid—and the

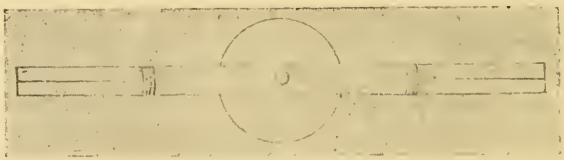
proboscis was drawn down into the latter with a pin-point Once there it was usually retained there, but individual butterflies varied. A few were restive from the outset, some soon became restive, others gorged to complete distention, and when allowed to go so far as this, tended—such at least was my experience—to stop laying.

Since I adopted the plan of putting my butterflies thus in the stocks for a daily feed I have had far less trouble in obtain-

A



B



Butterfly-Holder.
A = side view. B = view from above.

ing eggs—even where the box in which the insect was imprisoned measured no more than nine inches or a foot each way. It has, in fact, been my experience that smallish boxes, in which the butterfly has no great scope for battering and never gets very far away from the food-plant, are more successful than very large ones, and I am inclined to put down my early lack of success *in part* to my use of too large boxes. As for early deaths, my one complaint now is that so long as they are fed the butterflies tend to go on living indefinitely, even after they have laid their eggs. Where suitable boxes

are scarce this may be quite a nuisance. One does not care to kill in case there should still be some eggs to come : a *P. dardanus* ♀ f. *cenea* that had already laid 77 eggs went for several days without laying at all and then laid 31, nearly all fertile. However, the gradual loss of their legs—I have, I think, not known them to lay after losing them—eventually ends the career of even the most long-lived.

By means of this " forcible feeding " (fruit being in some cases substituted for the sugar-water) I have been able to keep the following butterflies alive for additional periods : *Atella phalantha*, Dr., *Precis archesia*, Cr., and *Precis sesamus*, Trim., *natalensis*, Staud., *Pseudacraea lucretia*, Cram., var. *expansa*, Butl., *Eurytela hiarbas*, Dr., *Pyrameis cardui*, L., *Hypolimnas misippus*, L., *H. wahlbergi*, Wllgr., *H. deceptor*, Trim., *Crenis rosa*, Hew., various species of *Charaxes* (not that these usually require special measures to make them feed), *Papilio dardanus*, Brown, *P. demodocus*, Esp., *P. lyaeus*, Doubl., and, *if I remember rightly*, *Leuceronia argia*, F., *Danaida chrysippus*, L., *Amauris ochlea*, Boisd., and one or two of the smaller *Acraeinae*. I have found, however, that even when fed as described the females of *P. dardanus* appear to lay badly when more than one is confined in the same cage. Careful regulation of sun and shade through the day is also of great assistance towards securing laying.

A point that should be mentioned is that, in practice, I found it advisable to use only one slit at a time. Where two butterflies were present, whichever individual first became restive at once unsettled her companion by the movement she imparted to the whole. The fastening down of the cork or the use of a heavier material might obviate this—were it really at all worth while.

I should imagine that the holder here described represents no new idea, for it is probable that many breeders of insects use such devices—many of them doubtless far better than the particular contrivance I happen to have adopted. It has been suggested to me, however, by Prof. Poulton that this method of feeding butterflies ought to be described for the benefit of any who do not know of it. It could doubtless be used for other insects too, for I have induced a dragonfly (*Anax speratus*,

Hagen), and Asilid flies of three genera (*Alcimus*, *Microstylum* and another) to feed on insects when held by the wings between finger and thumb. They had refused to seize and eat their prey when caged with it.

Note on the larvae of Anaphe panda, Boisd.—Mr. Swynnerton also read the following note on larvae as human food :—

The nests containing the gregarious larvae of *Anaphe panda*, Boisd. (usually, as Prof. Poulton informs me, placed in the *Eupterotidae* but considered by Aurivillius to be really one of the *Notodontidae*), are collected by the natives of Gazaland in S.E. Africa and the larvae eaten.

This is hardly of special interest in itself, for many other moth-larvae are also eaten by them, but what is perhaps of some slight interest is their alleged differential effect on particular individuals eating them. I was first informed of this by a native skinner and collector in my employ, whose statements I have in general found to be reliable, and he specially remarked that even brothers, eating from the same dish larvae that had been captured and prepared together, differed thus in their reaction : one brother suffering no ill-effects whatever, the other being always completely prostrated, for as much as two or three days in the more serious cases.

The statement has been completely corroborated by such natives as I have since spoken to on the subject. All have further agreed in saying that the larvae are much liked, and that their inability to eat them is felt as a misfortune by those whom they affect unpleasantly. It has not struck me to ascertain specially whether the ill-effects are due to urticating hairs or to some chemical substance contained in the larva. I have taken it for granted that it is the latter, seeing that the preparation of the larvae has been of a kind to destroy such urticating properties as the growing hairs might otherwise have exercised, but I may of course be wrong. The natives themselves appear to recognise a correlation between food-plant and *degree* of virulence, but I will go into this more particularly at some future time. The statements contained in this note may be taken as referring more particularly to such of the

larvae as have fed on *Bridelia micrantha*, Baill., their usual food-plant with us.

Papers.

The following papers were read :—

"A contribution to the Life-History of *Agriades thersites*, Cant.," by T. A. Chapman, M.D., F.Z.S., F.E.S.

"On a new form of Seasonal (and Heterogenetic) Dimorphism," by the same.

"Lepidoptera-Heterocera from South-East Brazil, pt. ii," by E. Dukinfield-Jones, F.E.S.

Wednesday, April 1st, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the chair.

Election of Fellows.

Mrs. Maria Ernestina Walsh, Soekaboemi, Java; Messrs. J. P. Ramakrishna Aiyar, B.A., F.Z.S., The Agricultural College, Coimbatore, South India; Eugène Bendefitter, 11 Rue St. Jaques, Le Mans, France; Rev. Prebendary Edward Grose Hodge, The Vicarage, Paddington; A. J. T. Janse, 1st Street, Gezina, Pretoria, S. Africa; Charles Nicholson, 35 The Avenue, Hale End, Chingford, N.E.; Frederic de la Mare Norris, B.Sc., The Agricultural Department, Kuala Lumpur, Malay States, were elected Fellows of the Society.

Exhibitions.

A Point in Mimicry.—Dr. T. A. Chapman exhibited some specimens of the genus *Curetis* from the Tring Museum, and read the following note :—

These specimens struck me as an instance of convergence of certain races of two species to a third species, that must have some mimetic element. So far as I know *Curetis celebensis* only occurs in Celebes, but probably has a wider

distribution in the Moluccas. Along with it flies a form of *C. tagalica* which closely resembles it, and in Batchian, which is no doubt some way off, is a form of *C. thetis*, the ♀ of which was named *egena* by Felder.

It will be noted that the ♂♂ make an extremely close approach to each other. The ♀♀ of *C. tagalica* and *C. celebensis* are in any case not very different. The ♀♀ of *thetis* have large white patches, but in var. *egena* the white is evanescent or absent, bringing it much closer to the others. The most salient points in the convergence of the ♂♂ are in the first place in regard to the upper surface. *C. celebensis* has the copper colour towards the apex of the fore-wing broken up by the dark veins; this I think occurs nowhere else in the genus, except in the forms of *thetis* and of *tagalica* here involved. Again *C. thetis* is especially characterised by having a pure white under surface, very rarely with a little trace of the first discal lines seen in most species of the genus, but in this var. *egena*, the under surface is nearly as fully marked as in *tagalica* and *celebensis*.

Pierines from Western China.—Dr. F. A. Dixey exhibited specimens of Pierinae from Western China, with drawings of their scent-scale, and remarked on them as follows :—

The Hope Collection has lately received, by the kindness of M. Charles Oberthür, several specimens illustrating the interesting butterfly fauna of Central Asia. A few years since, many of these forms were but little known in this country; now, however, that the Elwes specimens and the Leech and Crowley bequests are available for examination in the National Collection, they have probably been studied by most of those who are interested in the Palaearctic butterflies. However, I bring four of M. Oberthür's examples here to-night, because they help to illustrate one or two interesting points in Pierine affinities.

If we are to call all these four butterflies *Pieris*, we must use the generic name in a very wide sense indeed, and with a quite different content from that assigned to it by Mr. A. G. Butler. But with the help of the scent-scales we need have no difficulty in ascertaining for each of the four its place

among the white butterflies that have long been familiar to all entomologists.

The first of these four is the fine butterfly which Leech considered to be a form of *Pieris extensa*, Poujade, and to which he gave the varietal name *eurydice*. Its aspect at once suggests that it belongs to the group to which it is convenient to apply the generic name *Ganoris*; the group, that is, which includes our common whites, *brassicae*, *rapae* and *napi*. This genus or section is characterised by a very peculiar form of plume-scale, and an inspection of this structure in *P. extensa eurydice* at once shows that it is a true *Ganoris*. As will be seen from the drawings, the scale is very much like that of *G. napi*, though curiously enough it is on the average considerably smaller.

The next species, *P. davidis*, Oberth., has been accounted an *Aporia*, i. e. a member of the group to which our Black-veined White belongs. But here again the plume-scale solves the question of affinity, for it has the unmistakable character of a genuine *Ganoris*, and bears no resemblance to that of *Aporia*.

The third species, *P. delavayi*, Oberth., is far away from the former two. It is closely allied to the well-known form *agathon*, Gray, for which, with its nearest relatives, Mr. Butler established the generic name *Metaporia*. No *Metaporia* known to me has any scent-scales at all, though the ordinary scales of the wing have a distinctive character of their own, and are distinguishable without difficulty from those of *Ganoris*.

The last species on the list, *P. goutellei*, Oberth., has been placed, like *G. davidis*, in the genus *Aporia*. But its affinities are clearly with *agathon* rather than with *crataegi*, as it has no plume-scales, and its ordinary scales have the *Metaporia* character. *Aporia* and *Metaporia* are no doubt closely related, and without further examination I am doubtful as to how far the distinction between them will hold.

The Pierine group to which *daplidice*, Linn., *chloridice*, Hübn., *glauconome*, Klug, and some other forms belong, is conveniently known as *Synchloë*. I have here added drawings of the plume-scales of the two first-named species, in order to show how very distinct they are from the *rapae* and *napi* group. As I have

elsewhere pointed out, they share to a large extent in the characters of *Euchloë*.

New and rare Papilios.—Mr. O. E. Janson exhibited both sexes of a new *Papilio* belonging to the *gambrisius* group and apparently most nearly allied to *P. ormenus*, Guér., also the rare *Papilio gabrielis*, Roths., both recently received from the Admiralty Islands.

An Ant's nest and a Myrmecophilous Beetle.—Mr. Donisthorpe exhibited a small nest of the ant *Cremastogaster schenki*, Forel, fastened on the stem of a tree. This nest was brought home from Madagascar by Mr. R. Beck, F.E.S. These nests when older are as big as a football and are situated from 10 to 14 feet from the ground.

Also a small beetle, *Semiclaviger sikorae*, Wasmann, which came out of this nest, and is a guest of *C. schenki*.

Protura.—Mr. C. B. Williams exhibited specimens of the genus *Acerentulus* of the order *Protura*, taken, by means of a Berlese Funnel, in soil at Wimbledon, Surrey.

Remarkable Aberrations of Rhopalocera.—Mr. E. B. Ashby exhibited a ♀ of *Dryas pandora*, with darkly suffused underside hind-wing, very near the ab. *lilacina*, Obth., from La Granja; also an aberration of *Melitaea athalia*, from Hinterzarten, belonging to the *eos* group of aberrations of this species.

Papers.

The following papers were read :—

"Descriptions of South American Micro-Lepidoptera," by E. Meyrick, B.A., F.R.S., F.E.S.

"A revision of the Tipulid Genus *Styringomyia*," by F. W. Edwards, F.E.S.

Wednesday, May 6th, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the Chair.

Election of Fellows.

Messrs. E. W. Adair, Accolani Gardens, Shubrah, Cairo; Charles Percival Emmett, 2nd Lieut., East Surrey Regt.,

c/o Messrs. Cox & Co., 16 Charing Cross, London; and F. H. Gravely, The India Museum, Calcutta, were elected Fellows of the Society.

Obituary.

The death was announced of the Rev. E. N. Bloomfield, M.A., one of the oldest Fellows of the Society.

Exhibitions.

The Relation of Melanic Larvae to Melanic Imagines. —Mr. C. B. Williams exhibited the larva, cocoon and male and female adults of a dark olive-chocolate variety of *Lasiocampa quercus*, and read the following note :—

" In the spring of 1907, among several larvae of *L. quercus* taken on the coast sandhills at Wallasey, Cheshire, I noticed two much darker than the rest with the hairs almost black. One of these was preserved, the other spun up on June 4, making a very dark-coloured cocoon, and emerged on July 27 as a dark chocolate-coloured female (? var. *olivacea-fasciata*, Tutt). An attempt to pair this with a normal male was not successful. About the same time Dr. Bell of Wallasey obtained other dark larvae, which however remained in the pupa over the following winter and emerged in 1908 as the dark form. He was fortunate enough to obtain a male and a female on the same day, and from eggs laid after pairing only dark larvae were produced [*vide* Proc. Lanc. and Ches. Ent. Soc., 1908, p. 15]. Unfortunately, on account of the sudden illness of Dr. Bell none of these survived the winter.

" In the spring of 1910 Mr. E. T. Eskrigge of Wallasey obtained another dark larva from the same locality, and he was kind enough to place it in my charge. It emerged in July of that year as a dark male, but again I was unable to obtain a pairing.

" The result of the pairing obtained by Dr. Bell gives us no definite clue as to the Mendelian relation of this variety, but indicates a probability of its being recessive to the type form. This is further supported by the fact that this form has turned up occasionally from other localities (chiefly Yorkshire), but does not seem to have permanently established itself in any one locality.

" Perhaps the most interesting thing about this case is the correlation of the colour in the larva, cocoon and adult. Pearce [Entom. XV, p. 254] also records that a ♂ of this form bred at Portsmouth had a dark larva and cocoon. Although this correlation undoubtedly exists in the above cases, dark larvae do not always give rise to dark adults, and dark adults may arise from normal larvae. The only other case which I know in which there was a similar relation between the colour of the larva and the adult was in *Abraxas grossulariata* in a certain garden in Essex, where all the larvae were almost black and the adults were much darker than the type. This latter case may, however, have been accidental."

Mr. Sich observed that three or four black larvae of *A. grossulariata* which he had found had all produced quite normal imagines.

Papilionid scent-scales.—Dr. F. A. Dixey exhibited drawings of the specialised scales from the " greasy patch " on the fore-wing of *Ornithoptera priamus* f. *euphorion*, Gray, ♂, and from the fold of the hind-wing of *Cosmodesmus macleayanus*, Leach, ♂, *C. sarpedon* f. *choredon*, Feld., ♂, *C. eurypylus* f. *lycaonides*, Rothsch., ♂, and *C. eurypylus* f. *lycaon*, Feld., ♂.

The President, the Rev. G. Wheeler, and Mr. Sich made observations on this exhibit.

African Asilids.—Mr. S. A. Neave exhibited some flies of the Asilid genus *Hyperechia* from Mlanje, Nyasaland. They included a number of bred specimens of *Hyperechia consimilis*, Wood, found breeding in the same tree-trunk as a colony of the model *Xylocopa nigrita*. Pieces of the tree showing the burrows of the two insects were also exhibited.

Hyperechia marshalli, Aust., hitherto only known from the type in the Hope Department, with its model *Xylocopa flavorufa*, de G.

Mr. Neave also exhibited 9 examples of 3 species of *Hyperechia* captured " with prey," and pointed out that in every case the prey is Hymenopterous.

Messrs. E. E. Green, G. A. K. Marshall, J. E. Collin, and the Rev. G. Wheeler commented on the exhibit.

Tipulid larvae brought to the surface, probably

BY CONTINUED RAINS.—Prof. POULTON drew attention to an observation sent to him by Miss Margery G. Farnell, writing April 15, 1914, from Allerford, Somerset :—

" Suddenly on a rather damp path and flowerbed a wriggling mass of these larvae appeared. They are there in millions. Yesterday we swept up two barrows full and gave them to the trout, hoping they will devour them. Fresh ones wriggle to the surface every minute."

Miss Farnell had since stated that larvae came to the surface after the continued rains, and that they had not been brought up by the use of weed-killer, artificial manure, etc. At the date of her last letter, April 23, they were still appearing daily in thousands. Prof. Poulton said that they hoped to rear perfect insect from the larvae sent by Miss Farnell, and thus determine the species. It was evident from the size of the larva that the Tipulid was one of our larger species. Many years ago Prof. Poulton had recorded the fact that the carnivorous shelled slug *Testacella* was driven to the surface when the ground was water-logged.

Prof. Poulton also exhibited three Tipulid pupa-cases found protruding like an Egeriid from a dead beech stem at Wytham, near Oxford, May 30, 1913, by Mr. Joseph Collins of the Hope Department. All three were in the same trunk and near the ground. Mr. E. E. Austen had kindly determined the species as almost certainly *flavolineata*, Meig. A specimen in the Natural History Museum bore the note—" Larva lives in rotten birch wood."

THE RESTING POSITION OF THE AFRICAN NYMPHALINE BUTTERFLY HAMANUMIDA DAEDALUS, F.—Prof. POULTON said that his attention had been called by Mr. W. A. Lamborn to the following passage on page 316 of " Insects, Their Structure and Life," by G. H. Carpenter (J. M. Dent & Co., 1899) :—

" Butterflies rest as a rule with the wings folded over the back so as to expose the lower surface to view, and this is usually protectively coloured with a mottled pattern of brown or grey. An observation made on a common African butterfly —*Hamanumida daedalus*—shows the importance of the nature of the wing-markings in relation to the resting-attitude. In West Africa this insect rests with the wings folded over the

back, exposing the tawny under-surface, but in South Africa the wings are spread out, showing the brownish-grey upper side which harmonises with the colours of the rocks in that region."

In reference to this subject the author, in the appendix to his work, quoted W. L. Distant in "A Naturalist in the Transvaal," London, 1892, and in "Assimilative Coloration," Zoologist (4), ii, 1898. The volume last-mentioned contained two papers on "Assimilative Coloration," but no reference to *H. daedalus* could be found in either. The "Naturalist in the Transvaal" refers on pp. 41, 42, to the resting-habits of the species which were also discussed by Mr. W. L. Distant in "An Assumed Instance of Compound Protective Resemblance in an African Butterfly"—a letter written to "Nature" (XLIII, 1891, p. 390) from the Transvaal in January, 1891. Alike in this letter and in his volume Mr. Distant most carefully guarded himself, saying of the unconfirmed account of the attitude of the butterfly in West Africa, "if the reports as to its habits are correct," and "according to report." Mr. Distant had good grounds, from his own experience, to doubt the statement; for he tells us that, after watching for months in the Transvaal, he had never seen a specimen with the wings vertically closed, as described in Wallace's "Darwinism" (London, 1889, p. 207). The origin of Wallace's information was traced by the reference given in his footnote to a statement by Rutherford in these Proceedings for Aug. 7, 1878 (p. xlii). We here encountered the error at its source. Speaking of the sun-loving habits of *Aterica meleagris*, Cr. (*H. daedalus*), Rutherford said "He had never observed it settle on leaves, but always on the ground, and with closed wings, the under side of which have such a resemblance to the colour of the soil that he had always experienced the greatest difficulty in detecting the butterfly when at rest." He then went on to suggest that the under sides resembled the colour of the soil in various parts of Africa, exhibiting specimens from Senegambia, Calabar and Cameroons, Natal and the Mozambique coast, Masila (Usambara), and banks of the Atbara.

It was of course excessively unlikely that the same species

of butterfly would adopt different resting positions in two parts of its geographical range—attitude depending on the nervous system and being a far more deep-seated character than colour or pattern. Mr. Lamborn had fortunately paid especial attention to the point, and his observations, quoted below, proved that Rutherford's statement was an entire delusion.

"I must have now seen hundreds of *daedalus*, for it is the most abundant of all butterflies here, and, in my experience, which Mr. Farquharson can confirm, it never rests on the ground with the wings over its back; though the few specimens I have seen at night under leaves, in the attitude of sleep, of course have the wings approximated. In the resting position, with expanded wings, the body is inclined at a low angle to the ground. It is rare to see this butterfly settle at all on a green leaf: it prefers the ground, or a dead leaf on the ground."

It was satisfactory that the resting position of *daedalus* in the intervals between its flights, as well as during complete repose, had been now settled once for all. The colouring of the under surface—apparently procryptic—was probably of some value during that part of the period of complete rest which fell within the hours of daylight.

W. A. Lamborn's observations on the habits of the wasp, Belenogaster junceus, F., and the attacks of Tachinid flies upon it.—Prof. Poulton read the following note received recently from Mr. W. A. Lamborn, recording observations made at Moor Plantation, near Ibadan, Southern Nigeria.

"No. 426. 28th March, 1914. A nest of *Belenogaster junceus*, F., was constructed under the verandah of my laboratory during October, and in November four or five of the wasps might be seen clinging to the under side, feeding and guarding the larvae. A Tachinid was noticed one morning poised on the wing, first on one side of the nest and then on the other, and making every now and again a feint towards the nest, sometimes actually coming into momentary contact with it.

"Seeing that the wasps are well armed with a powerful sting, as I know to my cost, and, moreover, that they have

strong mandibles with which they can readily pulp up a caterpillar, I was surprised at their inability to cope with the little fly. All that they did was to huddle round on the side at which danger threatened, expanding their wings over their charges like a mother hen over her chicks; whereon the wily fly immediately made a lightning rush to the other side, though, as it had to make a détour, the wasp usually got into position before an attack could be made. From time to time the fly tried the same tactics at another nest near by. Unfortunately I did not manage to take it.

" In order to test whether the attempts at oviposition had been successful, it was necessary to leave the nest *in situ*, so that the wasps could continue to minister to the grubs, but the nest was torn down by some mischievous person late in the month. I found, however, the remains of several Tachinid pupae in its fragments. One wasp hovered about in the vicinity and ultimately, settling on the stalk of the old nest, recommenced building operations, the result being that now there is a large nest again, on the under side of which seven wasps are hanging. The Tachinid grubs must feed on the wasp grubs, for these are fed day by day by the wasps, the food being thrust direct into their open mouths, so that no store is laid by. I forget whether I mentioned that the excreta of the grubs are discharged out at the base of the nest and are removed by the wasps.

" The past week has been very hot, 103° and 104° F. having been registered as the midday shade temperature, and on March 25th, the clerk drew my attention to one of the wasps fanning the grubs. While still clinging to the nest the wasp set its wings in rapid vibration at such a rate that one could not see them, though the body was held immobile. This went on for a considerable time with short intervals of rest, and the clerk, a more observant man than most natives in this country, assured me that he had watched this manœuvre previously and had noticed that, when one wasp ceased the fanning, others took it up in turn."

Prof. Poulton said that so far as he was aware this was the first record of fanning by a wasp, although it was of course well known in the hive-bee, and Mr. A. H. Hamm had ob-

served the Carder Bee *Bombus derhamellus*, Kirb., cooling its larvae in this way when the nest had been opened and they were exposed to the direct rays of the sun.

W. A. Lamborn's observations on the method by which Tachinid flies escape from the mud cells of Eumenes.—Prof. Poulton read the following record of observations, received from Mr. W. A. Lamborn :—

"No. 517. A five-celled nest of *Eumenes maxillosa*, de Geer, was found on 26th March, 1914, built on to the wall of a cement tank, but was unavoidably broken in removal. One cell newly constructed and unsealed contained two green Noctuid larvae, both of the same species (at bottom of tube now sent), and a sausage-shaped ovum dangled from the roof. Another sealed cell contained a half-grown wasp grub and six Noctuid larvae, of at least two species, and different from those in the unclosed cell. Two of these had been partly consumed by the grub. The third cell contained a full-grown grub, and in the two remaining cells were *Tachinidae*, pupae in the one and pupae and one imago in the other.

"The discovery of this Tachinid imago gave me the opportunity of carrying out an investigation into the means by which the flies succeed in making their way through a stout mud wall into the outer world. The Tachinid pupae were placed in two old cells made by a wasp of the same species, and these were gummed on the inner side of the glass lid of a box, the edge having been previously rubbed down so that there was no possible hole of egress. In this way it was possible to observe every movement of the contained insects.

"On 27th March, at 7 a.m., it was seen that the flies were beginning to emerge and soon all were running about aimlessly over one another, stopping occasionally and then puffing the ptilinum in and out. Each act of distension of the ptilinum was accompanied by contraction and elongation of the abdomen, which was so tumid as to stretch the intersegmental tissues. The ptilinum itself was dilated to an extraordinary degree, for it was protruded in advance of the head for at least double its normal anteroposterior diameter, and, when thus fully protruded, an expansion from side to side in front of the eye took place, accompanied by an outward rotation

of the eye to such an extent that no part of its outer surface looked directly forwards.

" The movements of the flies, after a few minutes, became more active, and they commenced to push their heads against the walls of the cell, protruding the ptilinum as they did so. It was then seen that these movements were made for the purpose of discovering a weakness or depression in the wall, and when a fly found such a spot all its efforts were concentrated there. A fly would push its ptilinum into such a hollow and then alternately expand and contract it, partly rubbing away the mud and partly crumbling it back by pressure, and it frequently happened, when one fly gave up the attempt at a particular spot and moved on, that another discovered it and recommenced the work. As a result, the depression became deeper and deeper, and eventually in about an hour a breach was made. The first fly that escaped had a very great squeeze to do so, wriggling through by alternately contracting and expanding its body, and taking a long time. Two others very soon followed it, enlarging the aperture so that those emerging later were able to do so much more readily.

" The flies that had emerged remained still for about a quarter of an hour, during which the ptilinum was gradually retracted, and not till then did the wings commence to expand. Two or three did not succeed in getting out of the cell till midday, and kept crawling about alternately extruding and retracting the ptilinum all the time. One individual did not get out of the cell at all, and by night time its power of pushing out its ptilinum was very much diminished."

The growth of fungi on the shelters built over Coccidae by Cremastogaster ants.—Prof. Poulton gave an account of the following correspondence bearing upon the association between fungi and ants. The first letter was written to Mr. W. A. Lamborn by Mr. C. O. Farquharson:—

" *Moor Plantation, Ibadan.*
" *4th February*, 1914.

" I am greatly interested in the ant-fungus which you asked me to examine, and more than indebted to you for the opportunity of studying it along with ' Wheeler.' Let me say

to begin with that there are exceptional features about the Nigerian fungus-farmers. They belong, you say, to the genus *Cremastogaster*, and it would appear that those described by Wheeler belong exclusively to the great New World assemblage of the *Attii*. Further, so far as I can discover, most of the Attiines make their cultures under ground, *inside* their nests.

"In the case of the *Cremastogaster*, the fungus is formed outside and quite apart from the main carton nest, and the culture is an aerial one, growing on a shelter of chewed wood which the ants have made over a species of Coccid—surely a unique case of mixed farming. The ants with their nests occur on a laticiferous tree, a *Ficus* most probably, which has grown, for support, round the large tree on which the carton nest occurs, and, as you pointed out, they appear to be extremely fond of the latex.

"A further exceptional feature is the presence of the fungus in the form of a definite fructification, which I think I may without hesitation refer to the *Xylariaceae*, a sub-family of *Sphaeriales*, a sub-group of the Ascomycetes. The small black growths are the so-called stroma of the fungus, which may be simple or branched, and on this stroma two kinds of spores may be produced, first asexual (conidia), produced superficially over the upper part, and later a sexual ascigerous stage. It is from this latter stage that the fungus would be determined specifically, but so far only the asexual stage has been found. It most probably belongs to the genus *Xylaria*, of which there are one or two British representatives. If the ascigerous stage turns up it will be possible to get the fungus named.

"In the case of the Attiines the identity of the fungi appears to be largely a matter of conjecture. The 'kohl-rabi' growths or 'bromatia,' to use Wheeler's term, are nearly always sterile. He mentions that Moeller found on old nests of a species of *Acromyrmex*, an Agaric which he named *Rhozites gongylophora*, but, for reasons which he goes into in his book, Wheeler doubts the validity of Moeller's conclusion.

"To the fungus cultivated by a primitive Attiine, *Cypho-*

myrmex rimosus, Wheeler himself has given the name *Tyridiomyces formicarum*, which is described, rather vaguely, as it seems to me, from a systematic standpoint, as having elliptical cells much like those of the yeast plant (*Saccharomyces*).

" It is, I think, important to note that the fungi found by Moeller were on extinct or abandoned nests. From the description of Wheeler's *Tyridiomyces*, I am tempted to think that the fungus has been named from asexual spores (conidia). The sprouting of ' yeast-like ' cells from a mycelium is not uncommon, and these sprouted cells themselves in turn go on budding off asexual spores; but no ascospores ever occur, as in the true yeasts. This condition in which asexual sprouting goes on, and its relation to the substratum in fungi other than yeasts, is discussed in De Bary (' Comparative Morphology and Biology of the Fungi and Bacteria,' English Edition, 1887, p. 271). It occurs in both Basidiomycetes and Ascomycetes, the groups in which all investigators have looked for Ant-fungi. It is quite possible that Wheeler's fungus is merely a sprouting stage of a higher form.

" In the case of the *Cremastogaster* fungus, however, there is no question of ' old ' nests, for I notice in one or two cases, the sporophore is just beginning to break out from a ' shelter-substratum,' apparently but newly made over the Coccid which is accompanied by its ant.

" One or two questions seem to me to require answering. First, what is the precise relationship of the ant to the fungus ? The sporophore does not appear to be eaten. It may be, doubtless is, that the vegetative part of the fungus which would tend to grow *downwards* into the shelter, is the part eaten. Perhaps the Coccid secretion, exerting a chemotropic influence, would encourage this, which suggests another question—does the ant utilise the Coccid secretions directly, as is the usual course, or does it go to the nourishment of the fungus ? This postulates such a very high degree of specialisation that one hesitates to put the question, but why the mixed farming at all ? It must not be forgotten that we found the fungus apparently flourishing in the dry season. Marvellous as are the subterranean fungus-farms of the Attiines, those of

Cremastogaster, though on a small scale, appear even more remarkable, involving, as they do, the growth of aerial pure cultures, which, if they have become necessary to the ants' existence, must be maintained over a rigorous dry season, a wonderful feat of mycological technique. Perhaps with further study we may be able to throw some light on the problem.

" In conclusion, let me mention an interesting parallel in the supposed culture of a *Xylaria* by Termites. I have not had time to go into the subject of the fungi of Termitaries, but last tour I noticed in the Agege district that one or two fungi occurred with considerable constancy on ' ant-hills '—one, an Agaric, the other a small pink-tipped *Xylaria*. Unfortunately I have not got exact references here, but I have a distinct recollection of the mention of a *Xylaria* (if not of a few species) as occurring on Termitaria in Ceylon. The subject, from the mycological side, is discussed in a most full and interesting way by Mr. Petch in some of the Peradeniya publications."

Prof. S. H. Vines, F.R.S., had expressed his concurrence with the botanical details of Mr. Farquharson's communication. Dr. R. C. L. Perkins, D.Sc., had suggested that the fungi were similar to those with which he was familiar at Honolulu and in Australia. He thought it probable that they grew on the secretions of the Coccids and bore no relationship to the ants. To these suggestions Mr. Farquharson had replied, writing to Prof. Poulton, April 1, 1914 :—

" I read Dr. Perkins' note with interest, but I fear he imagines that we have indeed landed on a mare's nest. I think, however, he has not quite realised the significance of the family to which the *Cremastogaster* fungus belongs. Most people with any pretensions whatever to a knowledge of Entomology know that Coccid secretions are frequently infested with fungus mycelium, and ' sooty moulds ' are known to many who do not know the classification of the Perisporiales. The existence of fungi, pathogenic to scale insects, if their economic value is not unquestioned, is at least well known. From what I have seen of sooty moulds here, however, I should say that if their existence depended on the constant secretions of

their hosts, they would be less prevalent than they are, but the variety of resting spores and chlamydospores which they produce, gets over the difficulty in which the seasonal prevalence of their hosts would otherwise involve them.

" In connection with Dr. Perkins' observations on the condition of the leaves of trees in Brisbane and elsewhere, with their black coating of mycelium, it may interest him to learn that Citrus trees generally, which are notoriously beset with these fungi, are here extraordinarily free, and it is quite exceptional to see them.

" But to return to the *Cremastogaster* fungus, we were and are quite alive to the possibility that the fungus may be exclusively saprophytic on the Coccid secretions, and that proof is required that the ants actually eat the fungus or rear it. But pending proof, we laid stress on one or two points. The fungus is not a sooty mould, but belongs to rather a remarkable group not generally found in such situations. Though too much stress cannot be laid on the point, the curious analogy of fungi of the same family occurring on Termitaria was pointed out.

" From the outside standpoint of the mycologist I would put forward this suggestion. Is it not probable, if this fungus is growing at the expense of the Coccids, and so at the expense of the ants, that the latter would take measures to get rid of it? Even a comparatively small stroma such as the fungus forms would extract a great deal of moisture alone, apart from the other nutritious matter which the ants are likely to be after. Such stromata during their formation can frequently be seen covered with quite large drops of water—that is in confined spaces. In the open this of course evaporates, but the drain on the substratum would be even heavier.

" Further, as I pointed out, the effect of chemotropism would be to make the vegetative mycelium grow downwards inside the shelter, and, while interfering with the ants, might even more seriously impede the Coccids. (This is a point on which as a mycologist I am not quite clear, that is in what way the pathogenic fungi on Coccids kill their hosts.)

" Mr. Lamborn, who has had a much wider experience of

this particular case than I have, informs me that the association of this particular ant with Coccid and fungus is constant. It appears to me to be a point of some biological interest to explain how equilibrium came to be established, even if the fungus is not actually cultivated by the ants. Once the fungus has got on to even one shelter—and it does so very early—the ants by passing from one to another could hardly avoid spreading it even if they tried to abstain from doing so; and they appear to take no measures to stop the spread.

" One or two other questions I would like to put seem to me to be quite pertinent. The first is whether Coccids which are habitually associated with sooty moulds are usually ant-attended? There are ants of some sort on every tree here, but the point is whether precise ants are known to associate with precise Coccids which are at the same time habitually covered with sooty moulds. I have asked Dr. Lamborn, who thinks that ants are not thus associated. If this be so, may it not be because the fungus has the mastery and leaves nothing to the ants? Is the subsequent getting rid of its secretion a physiological necessity to the inert Coccid, which has come to be done in one of two principal modes—either by a sort of symbiosis with fungi or association with ants?

" If then the fungus-growths be purely adventitious as Dr. Perkins suggests, it is not improbable that the Coccid secretion does *not* enter into its nutrition. If it does enter into the nutrition of the fungus it would either be tolerated by the ants from the ulterior motive of feeding on the fungus mycelium, which, as I have shown, would tend to grow inwards, or it is to them consciously or unconsciously a nuisance. The fungus is then in a sense parasitising the ants; and it is none the less interesting in that. May it not have been in some such way that fungus farming originated among the Ants and Termites?

" I fear I have asked too many questions, when after all the *onus probandi* lies here. I fear that my ideas on the subject too are none too clearly expressed, and if my entomology is weak I hope I may be forgiven for a lamentable show of ignorance. I mean to go on with the inquiry however, for I think it is really very interesting and that there is more in it than may meet the eye."

Mr. W. A. Lamborn also sent a diagram and the photograph, taken March 28, reproduced below.

Mr. Lamborn remarked in the accompanying letter :—

" You will see that the fungus growth is quite a big thing, far larger than any sooty moulds, with which I have been

Fungi growing on carton shelters built over Coccids by *Cremastogaster* ants. The dark marks are the openings into the shelters. Photographed, about natural size, March 28, 1914, by W. A. Lamborn, at Moor Plantation, near Ibadan, S. Nigeria.

familiar in connection with Coccids, etc., for a very long time. I will collect a good number of the ants and examine the interior of nests, as far as possible, as you suggest. The fungus springs, as you will see, from the shelters, and has no direct communication with the Coccids or their secretions."

Mr. Farquharson's letter and the photograph were sent to Dr. Perkins, who replied April 24 :—

"I only received your letter of the 21st this morning. I wonder how near the natural size the photograph of the shelters is.* They look quite small things. The fungi look extraordinarily like some of the fine parasitic fungi (on Homoptera) with which we are so well acquainted in Honolulu, and in Australia, etc. I wonder whether they do not really spring from the Homoptera themselves. Trees blackened by fungus on Coccid excretions usually swarm with ants in the tropics, so much so that they cannot be beaten for insects without the beater being covered with ants, a most unpleasant thing in some parts of Australia, as I have experienced! However, the trees often remain black long after the Homoptera have gone or are quiescent, and in that case of course the ants no longer affect the trees. I still very much doubt that the shelters are anything more than the usual sort of thing I have observed. Sometimes the ants form a closed-in gallery from top to bottom of a tree, through which they proceed, carrying the Coccids, or they may be built merely as isolated chambers over these.

"I have published on the remarkable epidemics of these fungous diseases of Homoptera. It looks extraordinary to see trees covered with the bugs, each bristling like a hedgehog with the erect fungous growths (as in the figure sent by you), or, before the vegetation has proceeded thus far, to see the Homoptera sitting in hundreds on the bushes, life-like in appearance, but all dead. We have made cultures of some of these things in Honolulu. If I remember rightly cultures can be raised on honey-dew—I mean the mycelium will grow. We have first-class pathologists in Honolulu (three of them), but previously I used myself to investigate some of the fungous diseases of cane, etc. I cannot just now put my hand on our pathologists' reports on some of these fungi, but I fancy some of them belong to the group referred to in Mr. Farquharson's letter. I should certainly have suggested this had I seen the photograph before."

It was much to be hoped that Mr. Farquharson would be able

* The photograph, reproduced above, is probably very nearly of the natural size. E. B. P.

to pursue these interesting investigations much further. In the meantime his conclusions received support from Mr. Donisthorpe's account of fungus in the carton made by *Lasius umbratus* (Ent. Record, xxv (1913), p. 92, and xxvi (1914), p. 39), and of the observations which were brought before this Society in March of the present year.

W. A. Lamborn's account of the larvae of two species of the Geometrid genus Aletis in the Lagos District.—The following interesting observations were made at Oni Camp, 70 miles east of Lagos, and were sent to Prof. Poulton with the date Feb. 18, 1911. The genus *Aletis*, formerly included in the *Boarmiinae*, was now provisionally placed by Mr. L. B. Prout in the *Oenochrominae*.

"I was much exercised in mind about these Geometer moths [*Aletis erici*, Kirby, and *A. helcita*, Clerck], until, on looking at your photograph of kindred species, I saw two *Aletis helcita* among the others, and then remembered your reason for putting them in, viz. that you suspected them of being different species, though at present often mixed in collections. I think there can be no question about it now, for the larvae are so very different and there are also other considerations which favour the conclusion.

"The commoner larva [that of *Aletis erici*] is characterised by broad transverse bands of a bluish-black colour, alternating with white bands (with a trace of blue in them). The bands, both dark and light, in the tiny thread-like caterpillar (as far as I remember), and throughout the whole of larval existence are of the same equal breadth. The less common larva [that of *A. helcita*] is coloured the same as the other, but when it is tiny the bluish-black bands are very much narrower than the white bands. Furthermore, the early moults are followed by the appearance of a bluish-black linear and then diamond-shaped patch in the white band, and at each subsequent moult this patch changes its shape. The head and claspers are yellowish in both species. I just mention these facts hastily and without looking over specimens.

"The caterpillars feed on very different food-plants. The commoner larvae [*erici*] are gregarious [as shown in the following reproduction of a photograph taken by Mr. Lamborn].

"The less common larvae [*helcita*] are not gregarious, and I am sure that each egg is deposited by itself, for on every occasion on which I have visited the food-plant I have been able to return with two or three more little larvae—generally of different ages—gathered off widely separated leaves on the plant.

"The larvae [of *helcita*] have always been found on the under side of leaves."

Gregarious larvae of *Aletis erici*, photographed, about natural size, by W. A. Lamborn. Oni Camp, about 70 m. E. of Lagos.

Dr. G. D. H. Carpenter's observations in the islands in the N.W. of the Victoria Nyanza.—Prof. Poulton read the following letter recently received from Dr. Carpenter :—

"*Wema Island, Lake Victoria.*
"*March* 1, 1914.

"Since I last wrote to you Fiske and I have moved a good deal further east, towards Jinja, and we are now two days by canoe from Entebbe. The old banana plantations on some of the islands have still got enough food in them for our men.

"The island from which I am writing, Wema by name, is

about the twenty-fourth we have visited, and it is certainly the most beautiful. From the Tse-tse point of view it is a great success, and is of much interest in that *Glossina* is more abundant at one locality (a beach in front of thick forest) than I have ever seen it before. What do you say to one boy catching 78 in half-an-hour !

" The island is only a mile or two in greatest diameter, and we have only worked the south shore where there is a steep slope covered with forest and old banana plantations leading down to a beach several yards wide. *Never* have I seen so many butterflies congregated anywhere. Patches of this beach were favourite drinking-places, the sand being moist, and dozens of butterflies were sitting as closely packed as they could be, drinking. The long-tailed green *Cosmodesmus* [probably *policenes*, Cr.] was the commonest *Papilio*, but several other kinds of forest Papilios came down, many species of sulphur-coloured and black-and-white Pierids, *flocks* of *Atella phalantha* [Dr.] such as I have never met before, and many species of Lycaenids ! I have got specimens of most of the species we saw. Then in the forest and jungle at the back, all sorts of very nice things—half-a-dozen or more species of *Neptis*, *Charaxes* at least nine species, interesting skippers and blues, and forest Nymphalines whose names I know not. Euralias, however, were, curiously enough, absent : neither Fiske nor I have seen one here. *Pseudacraea boisduvali* [Dbl.] I saw once only, and could not catch, but it was, I think, of western type. *Ps. lucretia* [Cr.] was extraordinarily common, and I was much interested by the fact that Fiske, who did not know it, took it for a *Neptis*. You remember that I told you how I thought it was more like a *Neptis* on the wing than anything else. *Ps. eurytus* f. geogr. *hobleyi* [Neave] is fairly abundant, and I have got 6–8 specimens, but *all of the type form hobleyi :* I have not seen either *terra* [Neave] or *obscura* [Neave] or transitions on this island. This is the more to the point because the only *Planema* models I have seen, or that Fiske has seen, are those of the *hobleyi* pattern. Rather nice, isn't it !

" A curious point about the Lepidoptera of this island is that Acracines are *very* few in species, and those that *do* occur,

except *egina* [Cr.] and a large rosy red one whose name I don't remember, are very poorly represented. Thus, the small, usually swarming *terpsichore* [L.] and others of that type, are so scarce that I have only with difficulty found one specimen of one species !

" The *egina* females vary considerably here, but I have not taken specimens as pale as some that I got earlier on this trip on Bulago Isle. *A. zetes* [L.] is of very varied form on these islands, and, I think, on the whole much more eastern than western in appearance. Danaines also on this isle are very few in individuals. Fiske has seen a male *P. dardanus* [Brown], but I have not come across it.

" Lycaenids abound, but the Liptenine-mimetic forms are very, very few—only a single black-and-white forest species and *Pentila !* But the forest seems as if it *ought* to be very suitable indeed. It is certainly the richest butterfly forest of any place I have been to. Fiske and I reckon that *at least* there must be 150 species of butterflies in it and on the shore in front. I shall be sending you the specimens when I return to Entebbe towards the end of this month, with a map of the island and localities.

" Quite apart from the *Glossina* work there is a great deal of interest in the comparative study of these various islands, which present a great variety of conditions. Each one, as regards Lepidoptera for instance, has certain rather distinctive points. Thus, one has great swarms of common small Acraeines, on another *A. niavius* [L.] seems very abundant in proportion to the few other species. Another isle has a large variety of *Hesperidae*. I shall never forget one minute well-forested island, called Sanga, which was very beautiful when one got into its little forest. The great peacock blue-and-green skipper [*Rhopalocampta chalybe*, Westw.] abounded there, and one would see, with joy unspeakable, several of these glorious creatures at once, darting about or flirting with each other, their tints flashing in the sun. On this island *Mimacraea poultoni* [Neave] had been very plentiful when Fiske visited it in November, but I only got one specimen in February. Then on another island, where there were only about half-a-dozen species of butterflies (I think four were

Lycaenids), the woolly legged Lycaenid, I think *Uranothauma*, was quite surprisingly common.

" On Sanga also was another feature. A very conspicuous Geometrid larva (which I suspect to be *Aletis*) abounded to such an extent that it had defoliated and killed very many of its shrubby food-plants. It was orange with black blotches, and had a curious habit of resting—unusual for a Geometrid. It just hung vertically downwards, without the aid of any supporting thread, from a twig or bared leaf mid-rib, absolutely conspicuously and in crowds together.

" On other islands other features were noted :—great abundance of a species of slug, of *Chrysopsyche* larvae, of a rodent living in thick grass, of Coccids making woolly masses, etc.

" Several islands have an unpleasantly large number of *enormous* spiders' webs, in which I have seen a sun-bird caught fast. The webs form sheets, stretching across open spaces from tree to tree and not in one plane only. Numbers of them are spun one behind the other so closely that one wonders how on earth the owners of the middle webs ever get *anything* to eat ! And indeed many of them look half-starved ! Yet on other islands near by the species seems hardly able to hold its own : it is *just there*, and that is all one can say !

" The birds also are interesting : there is a small brown fly-catcher with white throat and belly which seems to prefer only the tiniest islets, a few hundred yards square, where one finds it amongst thickets of a mauve Composite weed. It has a song very suggestive of a nightingale. On another island I heard a thrush singing so sweetly that it made me feel very homesick. Its song struck me as very curious, because, although the bird abounds at Entebbe, I had never heard it sing either there or on Bugalla ! I thought perhaps it only occurred near human habitations, and yet here it was on just one island out of the many visited.

" There was another extraordinarily interesting thing about Sanga island. *Birds* seemed extremely scarce, especially such as might eat Lepidoptera. Now I quite soon noticed that some of the butterflies were *very* much easier to catch than they had been on Bugalla. Large Euralias, for instance, were

not particularly difficult of approach, whereas they were extremely difficult to catch on Bugalla where bee-eaters and fly-catchers abound. I noticed the same thing with *Aterica galene* [Brown], which, on both Damba and Bugalla, I had always found extraordinarily difficult to approach. On Sanga it allowed itself to be caught quite easily. This is very nice, isn't it? I only hope it was not just imagination on my part; but I *know* I had noticed it on one or two occasions at least before I had thoroughly realised that it was correlated with absence of birds!

"Sanga and other islands near, were also very interesting for the abundance of the great greenish-pink *Salamis*, which I had never seen in abundance before, and it really *was* a lovely sight.

"Fiske has had the luck to see a *M. poultoni* apparently ovipositing on Sanga island, at a time when they were numerous. It alighted to perform the act at the very tip of a dead dry branchlet of a certain tree. These dry branches are often hollowed out by ants for their nests, so that it certainly looks as if the larva were ant-ophilous (I forget the correct term!). You may remember that I suggested the explanation of my catching the butterfly in my house at Bugalla was either that it had been introduced in an early stage, on the material used for house-building, or that it passed its larval life possibly in *Belenogaster* nests. Fiske's observation makes the former quite likely."

Mr. Bacot commented on the great interest of Prof. Poulton's communication regarding a species of wasp "fanning" to cool its larvae during a period of great heat, in view of Blacklock's observation, "Annals of Tropical Medicine and Parasitology," Vol. iv, No. 4, Dec. 12, that on exposure to 45° C. = 113° F. larvae of *Cimex lectularius* died within a few minutes and adults within an hour. An experiment which he had made showed that the larvae of this species were quite active after an hour's exposure to 44° C., but died within a few minutes at the higher temperature. Heat had been used by friends of his to kill Lepidoptera in the absence of the usual poisons. The insects were quite relaxed after death.

Papers.

The following papers were read, both being illustrated with the Epidiascope :—

"New species and subspecies of *Pierinae*," by F. A. Dixey, M.A., M.D., F.R.S., Fellow of Wadham College, Oxford.

"On the Taxonomic Value of the Genital Armature in Lepidoptera," by G. T. Bethune-Baker, F.L.S., F.Z.S., President of the Entomological Society of London.

Wednesday, June 3rd, 1914.

The Hon. N. C. Rothschild, M.A., F.L.S., F.Z.S., Vice-President, in the Chair.

Election of a Fellow.

Mr. Reginald Temperley, l'Aurore, Vevey-la-Tour, Switzerland, was elected a Fellow of the Society.

Exhibitions.

A living Neuropteron.—Mr. E. E. Green exhibited a living specimen of *Raphidia xanthostigma*, taken at light in a house at Camberley, on June 1. In captivity it had fed freely on Aphides.

Conops vesicularis, L., from Camberley.—Mr. Green also exhibited an example of *Conops vesicularis*, L., caught amongst heather at Camberley on April 29. He observed that this fly appears to be very local, being principally confined to the New Forest district.

Living specimens of Berytus clavipes.—Mr. E. A. Butler exhibited living specimens of *Berytus clavipes*, Fab., with eggs on leaves of *Ononis*. Taken on a roadside bank at Royston, Herts., June 1, 1914.

A specimen of Pygolampis bidentata.—Mr. Butler also exhibited, on behalf of Mr. W. West, of Lewisham, a ♂ of *Pygolampis bidentata*, Goeze, swept in New Forest, May 22, the second recorded British specimen of this insect, the first

having been taken about eighty years ago under a slab of sandstone near Bridgenorth, Salop, by Mr. T. Marshall of Leicester.

African Tabanidae.—Mr. S. A. Neave exhibited some African *Tabanidae* bred by him on his recent visit to Nyasaland on behalf of the Imperial Bureau of Entomology, including *Tabanus biguttatus*, Wied, *T. corax*, Lw., *T. ustus*, Walk., *T. taeniola*, P. de B., *T. fraternus*, Macq., *T. maculatissimus*, Macq., *T. medionotatus*, Aust., *T. obscuripes*, Ric., *T. nagamiensis*, Cart., *T. laverani*, Surc., *T. sharpei*, Aust., *T. variabilis*, Lw., *T. atrimanus*, Lw., *T. gratus*, Lw.; *Chrysops wellmani*, Aust., *C. magnifica* var. *inornata*, Aust., *C. longicornis*, Macq., *Chrysops* sp. nov., *Haematopota decora*, Walk., *H. crudelis*, Aust., *Haematopota* sp. nov. He also exhibited the larvae of most of these species. After making a few remarks on the conditions under which these were found he also showed a few of the more striking Tabanids collected on the same tour, including two new and peculiar species of *Chrysops* and two remarkable insects for which new genera would perhaps be required.

Mines of Nepticula acetosae.—Mr. Sich exhibited mines of the larva of *Nepticula acetosae*, Stt., in a leaf of *Rumex acetosa*, L., from Richmond, Surrey.

An Ichneumon new to Britain.—Mr. J. H. Durrant exhibited an Ichneumon which he had captured in a mill in Bermondsey on the 5th of December, 1913, and which had been identified by Mr. Claud Morley as *Nemeritis canescens*, Gravenh. (*Campoplex canescens*, Gravenh.; = *Idechthis oahuensis*, Ashm.; = *Amorphota ephestiae*, Cameron). This Ichneumon, which has not been recorded as British, is of economic importance, being parasitic on *Ephestia kühniella*, Z. The specimen was taken in connection with the Army Biscuit Enquiry.

Families reared from the eggs laid by known females of Papilio dardanus, Brown, at Chirinda, S.E. Rhodesia. —Mr. C. F. M. Swynnerton read the following communication :—

When I returned to Africa in 1908, and many times since by letter, Prof. Poulton urged me strongly to breed *Papilio*

dardanus at Chirinda. Attempts in 1911 and 1912 failed, owing, *inter alia*, to a failure to get the butterflies to feed in captivity. In 1913, however, I was successful in obtaining eggs not only from a number of *hippocoon* females but from two *cenea* females, one *trophonius*, and a female which Prof. Poulton considers to be nearest to the *leighi* form, but with some considerable approach towards the pattern of *hippocoon-trophonius*.*

At Chirinda the wild females of *Papilio dardanus* lay on various *Rutaceae*—orange and lemon both wild and cultivated, lime, *Clausena inaequalis*, *Toddalia acuminata* and *Teclea swynnertonii*. In captivity they seemed to lay best on the last-named plant, and, as it was also very common in the forest, I started all the young larvae on it. Completely spider-tight boxes were, however, a difficulty, and at that time of the year (the change from the wet to the dry season) small spiders swarm. They killed numbers of the newly hatched larvae, and the time occupied in examining the boxes daily for these very inconspicuous little spiders was so great that I finally decided to " sleeve " the families. Lemon-trees were growing beside the house and the larvae took kindly to the change of food : but a new difficulty arose. My ground-hornbills (*Bucorax caffer*) were discovered going the round of the conspicuous white muslin sleeves and jumping or flying up to them and seizing them with their bills. They had already done much damage to the inmates when discovered, and, though the sleeves were put higher, a watch kept, and the birds continually driven off, they did (as any one who knows a ground-hornbill's persistence will readily understand) get in on subsequent occasions. At any rate, the losses inflicted by them were, I believe, considerable, and they were responsible not only for these but, in the main, for an unusually large proportion of crippled specimens. Each family is, therefore, by no means complete.

On one occasion a few labels were found to have been removed. As the pins by which they were attached had also gone it is more likely to have been the work of a native

* The notes on the pattern at the end of the present paper were written by Prof. Poulton (see p. lxiii).

than that of the hornbills; but the difficulties raised by the loss have fortunately proved not to be of a very important nature. They will be dealt with in the list of families.

All the mothers of the families were captured feeding or laying either in my garden or at some Zinnias and Tecleas on the Chirinda Forest outskirts, or elsė (in a few cases, among which I think the *leighi*-like parent was one) between the two places—a distance of probably 400 yards.

A word about the laying conditions may be worth adding. I found rather small cages in which the butterfly did not easily lose touch with the food-plant the most successful. Flowers (Zinnias, Verbena and Madagascar Periwinkle—all favourites) were placed in each box, but the butterflies were so bad at feeding in captivity that I could not trust to this, and gave each at least one daily " forcible " feed of sugar water by a method that I have described in a previous short communication. Sun seemed rather important, but was injurious when too hot. I kept all the cages in a verandah and shifted them with the shifting of the sun in such a way that they received mixed sun and shade for as much of the day as possible. On hot days I syringed the whole inside of the cage three or four times with water. I also in some of the cages tried lining the bottom with moss in order to hold the moisture. Using these methods I was very successful indeed in obtaining eggs. I cannot lay hands on my detailed notes at the moment, but I believe I am safe in saying that at any rate one butterfly lived for nearly three weeks. A point perhaps worth mentioning is that the confinement of several butterflies together, even in a large cage, did not seem to succeed. They unsettled each other, a flutter on the part of one starting the rest off too, and I obtained but few eggs in the cases (S and T) in which I tried this plan.

It is perhaps interesting that, as I understand from Mr. Leigh occurs in Natal, larvae of *P. dardanus* that pupate in the late rains or early winter remain in the pupal state till what I call at Chirinda the " *Vernonia*-season " arrives—in August and September. Not only are frosts now over, but *Papilio*-haunted flowers are out in abundance. I noticed in some of the broods that pupated in very cold weather a

resemblance of the pupae to the cold-touched leaves of winter instead of the luscious greenness of the leaves and pupae of the wet season. This was even more marked in a brood of *P. demodocus*, Esp., that I reared at the same time.

At Prof. Poulton's suggestion that a cross between a Chirinda insect, with *hippocoon* predominant in its ancestry and a Natal individual, bearing perhaps equally strongly a *cenea* tendency, would be interesting, I sent to Mr. G. F. Leigh, packed rather loosely and enclosed in a perforated tin, a few pupae from (if I remember rightly) Family T. Though he failed, I believe, to mate them with Natal individuals, it is interesting to record that those which did not emerge en route survived the journey. Perhaps we may be more successful in the actual crossing next time.

Finally I wish to thank Prof. Poulton very warmly both for putting me on to so fascinating an experiment and for his continual encouragement. It is an experiment that I intend to repeat with more material and greater precautions on my return to Africa. Not only must the experiment be regarded as purely his, but all work in connection with the butterflies since they reached England and the work of compiling the lists that follow, have been done in the Hope Department.

The families are arranged in two tables on pp. lxi, lxii. In the first, containing 18 *hippocoon* parents and their offspring, only the inclusive dates of emergence from the pupa are given. In the second table, containing the family of one *hippocoon* parent and those of four parents of other forms, the dates of emergence are set down in detail. It is thus possible to trace the relationship between the emergence of the different female forms in the same family. The families included in the second table also show the tendency of certain pupae in a family to lie dormant for a considerable period, so that emergence is postponed, as already explained on p. lix.

The reference letters follow the order in which the female parents were captured.

Females in some of the families tabulated above possess vestigial tails to the hind-wings in an unusual degree. They are especially well developed in Families D, E, and V. It is possible that the appearance of these ancestral structures

♀ parents. All *hippocoon*. Reference letters and dates of capture in 1913.	Dates of oviposition and death in 1913.	Dates of hatching (H) and emergence (E) in 1913.	Offspring. Males.	Offspring. *Hippocoon* ♀.
A. About Feb. 9.	Laid Feb. 10.	Pupated Mar. 26–29. E. Aug. 15.	—	1
E. About Mar. 23.	Laying over by Mar. 29.	H. over by Apr. 7. E. July 7 (about)–29.	4 (2 unemerged).	5
F. Mar. 28.	Died Apr. 3.	H. Apr. 5–7. E. July 27–Aug. 1–2.	2	—
G. Mar. 29.	Laid Mar. 29–30. Died Apr. 1.	H. Apr. 7. E. July 24–Aug. 12.	6	3
H. Mar. 30.	Died Apr. 12.	E. July 28–Aug. 11.	4	5 (1 unemerged).
I. Mar. 30.	Died Apr. 4.	H. from Apr. 9. E. July 12–(about) 16.	1	5
J. Mar. 30.	Laid up to Apr. 2.	H. Apr. 7. E. Aug. 1–6.	1	5
K. Mar. 30	Died Apr. 7.	H. from Apr. 7. E. July 24–Aug. 31.	2	2
L. Mar. 30.	Laid at once up to Apr. 3.	H. Apr. 7–9. E. July 23–31.	4	4
M. Label lost, but almost certainly rightly placed. Mar. 31.	Died Apr. 4.	E. July 29–Aug. 11, and 1 ♂ Sept. 17–21.	7 (9 recorded).	12
N. Apr. 1.	Died Apr. 7.	E. Aug. 4–22.	1	3
O. Apr. 2.	Died Apr. 11.	E. July 28–Aug. 20.	3	6
P. Label lost, but parent probably rightly placed; if not, it can only belong to R. Apr. 4.	Died Apr. 11.	H. from Apr. 12. E. Aug. 1–12.	7	4
Q. Apr. 5.	Died Apr. 13.	H. (many) Apr. 16. E. Aug. 4–15.	8	8
R. Label lost, but parent probably rightly placed; if not, it can only belong to P. Apr. 4.	Laid 22 eggs in 12 days. Died Apr. 16.	E. Aug. 1–22.	5	10
S. 4 females. Apr. 8–12.	Died Apr. 11–20.	E. Aug. 11–26, & 1 ♂ Sept. 17–21.	12	9
T. 6 females.	3 died Apr. 21–May 3.	H. from Apr. 24. E. Aug. 10–23.	3	7
V. Apr. 17.	Died Apr. 28.	H. from Apr. 28. E. Aug. 16–30.	11	16

Reference letters, forms, and dates in 1913 of ♀ parents.	Dates of emergence in 1913.	OFFSPRING. Males.	*Hippocoon* ♀.	*Cenea* ♀.	*Trophonius* ♀.	*Leighi*-like ♀.
C. *Hippocoon* ♀ form. Captured about March 4. Escaped.	June 7		1			
	Aug. 11	1	1			
	Aug. 30		1			
	Totals	1	3			
W. *Trophonius* ♀ form. Captured April 18. Died May 6.	Aug. 21	1				
	Aug. 23	1				
	Aug. 26				1	
	Aug. 27		2			
	Aug. 28	1				
	Sept. 2				1	
	Sept. 2–3	1			1	
	Sept. 9	1	1		1	
	Sept. 17–21	2				
	Totals	7	3		4	
B. *Cenea* ♀ form. Captured about February 15.	May 4		1			
	May 20			1		
	Aug. 13			1		
	Aug. 28	1				
	Totals	1	1	2		
U. *Cenea* ♀ form. Captured April 14, p.m. Died May 2. Laid over 100 eggs: first 77, and then, after an interval, 31 in one day, mostly on the ground.	Aug. 9		1			
	Aug. 22	1				
	Aug. 23			1		
	Aug. 25			1		
	Aug. 26			1		
	Aug. 27	1				
	Aug. 28	1				
	Aug. 29–30	3	3			
	Aug. 30		1			
	Sept. 3	3	1			
	Sept. 7		2			
	Sept. 8	1				
	Sept. 9	1				
	Sept. 18		1			
	Sept. 19		1			
	Sept. 17–21	6	3	1		
	Totals	17	13	4		
D. *Leighi*-like ♀ form. Captured March 11–12. Laid 35 eggs. Killed by spider March 13.	June 15	1				
	June 22	1				
	June 23	1				1
	Aug. 4					1
	Aug. 13	1				1
	Aug. 16		1			
	Aug. 21		1			
	Aug. 22	1				
	Aug. 26	1				
	Sept. 1		1			
	Sept. 3					1
	Undated					1
	Totals	6	3			5

is connected with the attacks of ground-hornbills or with some other unfavourable condition; for it is to be noted that the females captured at Chirinda are on the whole considerably larger than the bred ones. On the other hand 2 out of 18 captured Chirinda females in the Hope Department bear distinct traces of "tails." H, I, P and O are other families which exhibit well-marked vestiges in single females or slight traces in more than one.

The female parent of Family D was a remarkable form, well-known, although rare, in Chirinda. The first of its female offspring to emerge was much nearer to *leighi*, Poulton, than the parent or any of the 4 other offspring of this form. The parent and these 5 offspring resemble *leighi* in the relative paleness of the hind-wing patch, but the difference between this and the other markings is much less than in *leighi*, whose fore-wing spots and patches are richer and deeper in tint. The squareness of the hind-wing patch is a peculiar feature, especially pronounced in the parent and two of the offspring, in which the angle opposite the end of the cell is drawn out to a remarkable extent. The pattern of the Chirinda form differs from that of *leighi* in the spreading of the principal spot into a triangular marking with its base along the inner margin of the fore-wing, resembling but much smaller than the corresponding feature in *hippocoon* and *trophonius*. A broad tract of scattered dark scales indicates the distinction between the principal spot and the rest of the marking, while the two elements are almost entirely separated in the most *leighi*-like individual.

A FAMILY CONTAINING NINE HIPPOCOON AND EIGHT DIONYSUS BRED FROM A HIPPOCOON FEMALE OF PAPILIO DARDANUS IN S. NIGERIA BY W. A. LAMBORN.—Prof. POULTON exhibited all the female offspring together with 2 of the males and the female parent, of the form *hippocoon*, F., captured by Mr. W. A. Lamborn at Moor Plantation (480–580 ft.), 4 miles west of Ibadan, S. Nigeria. The female, taken Nov. 19, 1913, oviposited 19–23 and died Nov. 24. The whole life-history was passed in the dry season, which began Nov. 5.

Some of the pupae were exposed to cold for the periods shown in the tabular statement. The conditions were described by Mr. Lamborn as follows :—

" The ice came up from Lago each Tuesday, Thursday, and Saturday, always at the same hour, and was at once placed in a suitable box. As the quantity never varied to any extent and as the outer temperature kept fairly constant, the mercury in the box followed a nearly uniform course, remaining at 5° C. for about 18 hours after the ice had been put in and then gradually rising. On the following night at 7 p.m. it averaged 12° C. and on the third day without a fresh supply of ice, *i. e.* on Mondays, it averaged about 20° C. During the course of the experiments the mid-day shade temperature averaged 32° C., and the midnight temperature about 22° C., although occasionally as low as 17° C. Two pupae were exposed to a moist atmosphere at normal temperature."

The results of this most interesting breeding experiment are shown in tabular form below, pp. lxv, lxvi.

It was clear from the above table that, as Mr. Lamborn recognised, " these *dionysus* have not been produced by chilling the pupae." Nor was any other effect to be made out when the imaginal colours and patterns were studied in relation to the conditions of temperature or moisture to which their pupae had been exposed. The *hippocoon* were very constant, as also were the under surfaces of the males, where some effect of the varying conditions was perhaps to be expected. On the upper surface the extremely variable inner black band of the hind-wing was certainly not more variable than is usual in the male offspring of the same parents. As regards variability the 8 *dionysus* stood in startling contrast to their 9 *hippocoon* sisters, especially in the development of the oblique black bar crossing the fore-wing. Very minute traces of " tails " to the hind-wing were also present in one or two *dionysus* but not in others. It was in every way probable that the constancy of the *hippocoon* and the variability of the *dionysus* were related to the presence and predominance of an excellent Danaine model, *Amauris niavius*, L., for the first form, and the absence of a model for the second. This interpretation was confirmed by Mr. Swynnerton's Family D (p. lxiii), reared from a female form related to *leighi* and without any model at Chirinda. In this family, too, the *hippocoon* offspring were constant and the *leighi*-like offspring highly variable.

Reference number.	Exposure of pupae to cold, moisture or normal conditions.	Date of pupation, 1913.	Date of emergence, 1913.	Sex and female form.	
1	Normal conditions.	Nov. 21.	Dec. 2.	*Hippocoon* ♀.	In this and all the other *hippocoon* offspring the spot in F.W. cell is considerably smaller than in the *dionysus*.
2	Normal conditions.	Nov. 22.	Dec. 4.	Male.	—
3	Normal conditions.	Nov. 23.	Dec. 5.	*Hippocoon* ♀.	—
4	In ice-box Nov. 20–30.	Nov. 20.	Dec. 6.	Male.	—
5	In ice-box Nov. 23–29.	Nov. 21.	Dec. 6.	Male.	"Anal gap" in H.W. inner black band widely open.
6	Normal conditions.	Nov. 22.	Dec. 6.	Male.	"Anal gap" widely open as in 5.
7	In ice-box Nov. 23–29.	Nov. 22.	Dec. 6.	*Hippocoon* ♀.	The only specimen with the spot in F.W. cell divided.
8	Normal conditions.	Nov. 23.	Dec. 6.	Male.	"Anal gap" widely open as in 5 and less interrupted by a central streak.
9	Normal conditions.	Nov. 23.	Dec. 6.	Male.	—
10	Normal conditions.	Nov. 23.	Dec. 6.	*Dionysus* ♀.	Seventh in development of oblique F.W. bar. Powdering so scanty at end of cell that the bar is breached by a wide gap. Faint vestige of "tail" of H.W. rather more distinct than in others.
11	In moist air Nov. 23–Dec. 4.	Nov. 23.	Dec. 6.	*Dionysus* ♀.	Third in development of oblique F.W. bar.
12	Normal conditions.	Nov. 23.	Dec. 6.	*Dionysus* ♀.	Oblique bar crossing F.W. blackest and most strongly developed.
13	In moist air Nov. 23–Dec. 4.	Nov. 23.	Dec. 6.	*Hippocoon* ♀.	—
14	In ice-box Nov. 23–29, and 7–9 p.m., Dec. 6.	Nov. 22.	Dec. 7.	*Hippocoon* ♀.	—
15	In ice-box 7–9 p.m., Dec. 6.	Nov. 23.	Dec. 7.	Male.	—
16	In ice-box 7–9 p.m., Dec. 6.	Nov. 23.	Dec. 7.	*Dionysus* ♀.	Second in degree of development of oblique bar of F.W.

Reference number.	Exposure of pupae to cold, moisture or normal conditions.	Date of pubation, 1913.	Date of emergence, 1913.	Sex and female form.	
17	In ice-box Nov. 25–29.	Nov. 21.	Dec. 8, 4 p.m.	*Dionysus* ♀.	Sixth in development of oblique F.W. bar. Similar to No. 19, but trace of bar is narrower.
18	In ice-box Nov. 23–29, 7–9 p.m., Dec. 6, and 7–9 p.m., Dec. 7.	Nov. 21.	Dec. 8.	*Hippocoon* ♀.	—
19	In ice-box 7–9 p.m., Dec. 6.	Nov. 23.	Dec. 8, 7 p.m.	*Dionysus* ♀.	Fifth in development of oblique F.W. bar. Central part of bar represented by powdering of black scales.
20	In ice-box 7 p.m., Dec. 6—7 p.m., Dec. 7.	Nov. 24.	Dec. 8, 5 p.m.	Male.	—
21	In ice-box 7 p.m., Dec. 6—7 p.m., Dec. 7.	Nov. 24.	Dec. 8, 7 p.m.	Male.	"Anal gap" nearly as widely open as in 5.
22	In ice-box Nov. 24–29; 7 p.m., Dec. 6—7 a.m., Dec. 7; and 7–9 p.m., Dec. 7.	Nov. 24.	Dec. 8.	*Dionysus* ♀.	The oblique F.W. bar far less developed than in any of the other 7 *dionysus*, being only represented by a very scanty powdering of black scales.
23	Normal conditions.	Nov. 26.	Dec. 8, 7 a.m.	Male.	—
24	Normal conditions.	Nov. 26.	Dec. 9.	Male.	—
25	In ice-box Nov. 24–29; 7–9 p.m., Dec. 6; and 7–9 p.m., Dec. 7.	Nov. 24.	Dec. 10.	Male.	"Anal gap" widely open as in 5.
26	In ice-box Nov. 24–29; 7 p.m., Dec. 6—7 a.m., Dec. 7; and 7–9 p.m. Dec. 7.	Nov. 24.	Dec. 10.	Male.	—
27	Notes lost.	Nov. 24.	Dec. 10.	*Hippocoon* ♀.	—
28	In ice-box Dec. 6–8.	Nov. 25.	Dec. 10.	Male.	—
29	In ice-box 7 p.m., Dec. 6—7 a.m., Dec. 7; and 7–9 p.m., Dec. 7.	Nov. 25.	Dec. 10, about 5 a.m.	*Dionysus* ♀.	Fourth in development of oblique F.W. bar.
30	In ice-box 7 p.m., Dec. 6—7 a.m., Dec. 7; and 7–9 p.m., Dec. 7.	Nov. 23.	Dec. 11.	Male.	—
31	Normal conditions.	Nov. 29.	Dec. 13.	*Hippocoon* ♀.	—
32	Normal conditions.	Nov. 25.	Dec. 14.	*Hippocoon* ♀.	—

The retention of spaces for the " tails " in the pupae of the tailless females of Papilio dardanus.—Prof. Poulton read the following observations by Mr. W. A. Lamborn on the larvae and pupae of the family described in the last section. The notes had been extracted from a letter dated Dec. 9, 1913.

" They have given me the utmost pleasure, and I have been constantly inspecting pupae every night for the first indications as to what they were going to be. This has shown me that the pupal wing-cases are the same in shape in both sexes, but whereas, in the male, the tails can readily be seen on either side of the mid line on the night before emergence, in the female the space for their reception, though present in an equal degree, is unoccupied by wing-tissue, a little point which seems to me to support the contention that more ancestral forms of the female were tailed. I think you will see what I mean by an examination of the pupa-cases, but by and by I must put some pupae in spirit. You see I have not forgotten the text of your Linnean papers,* on these points."

Considering the position of the " tails " upon the hind-wing, it seemed, at first sight, strange that these structures should lie near to the middle ventral line. There were fortunately present, in Mr. Swynnerton's Family E (p. lxi), two male pupae containing fully formed imagines which had failed to emerge. These were examined by Dr. Eltringham and Prof. Poulton, who found that the apical angle of the unexpanded hind-wing was much flattened down, so that the costal margin together with the hind margin, as far as a broad short projection representing the " tail," formed a continuous and only slightly curved line lying along that margin of the pupal hind-wing which was nearly parallel with the mid ventral line. The posterior end of this margin extended beyond the fore-wing so that the unexpanded " tail " could be seen within it.

The Mendelian relationships of the female forms of

* Trans. Linn. Soc., Lond., 2nd ser., Zool., Vol. V, Pt. 5, 1890, p. 187; and Vol. V, Pt. 7, 1891, p. 245. Mr. Lamborn's important and interesting discovery is an illustration of a luminous hypothesis originated but never published by the late Prof. H. N. Moseley, communicated by him to Prof. Poulton in 1884, further worked out and made public in the second of the above-quoted papers.

P. DARDANUS.—Prof. POULTON said, in reference to the breeding experiments of Mr. Swynnerton and Mr. Lamborn, that at first when we only had before us families of *dardanus* from the Durban district, it seemed hopeless to expect that the Mendelian relationships would be made out. He had shown some of these families to Prof. Bateson, who agreed that, with three forms of mimetic female and the unknown potentialities of the non-mimetic males, the facts were so complex that a solution was improbable. Some years later Mr. J. C. F. Fryer's success with *P. polytes*, L., in Ceylon, made the problem appear far more hopeful, and it had occurred to Prof. Poulton that light might be gained by breeding *dardanus* in parts of Africa where one form was extremely predominant over the others. Although *cenea* was the commonest form in the extreme S. and S.E. of Africa, *hippocoon* was even more predominant on the West Coast and in most of the forested areas N. of Natal. In one of these areas—Chirinda in S.E. Rhodesia—offspring had been reared from 19 *hippocoon* parents by Mr. C. F. M. Swynnerton, as recorded on the present occasion (pp. lvii–lxiii). All the offspring were *hippocoon*. Seven families had been reared by Mr. W. A. Lamborn from the corresponding form in S. Nigeria, and in all except the one now recorded, *hippocoon* offspring and these alone had been obtained. The uniformity of this result suggested that *hippocoon* was a recessive and that a predominant number of males carried the *hippocoon* potentiality. The same conclusion was reached with much greater certainty when we studied the families reared from females of the rarer forms in the areas where *hippocoon* was so predominant. These families—4 in Chirinda and one reared by Dr. G. D. H. Carpenter in Bugalla Island—always contained *hippocoon* offspring as well as offspring of the female parent form. It is probably safe to assume that the unknown male parent of these 5 families carried the *hippocoon* potentiality. If the male carried *hippocoon* as a dominant relatively to the other female forms all the offspring would have borne the appearance of *hippocoon*. The hypothesis that the male parent carried *hippocoon* as a heterozygote was extremely improbable, because of the great numerical predominance of this form and the relatively few matings that were likely to occur with any

other. We were driven to believe therefore that *hippocoon* was recessive and that the rarer forms were relatively to it, heterozygotes or true dominants. But if the rarer females were true dominants mated with males carrying the recessive *hippocoon*, none of the offspring should have borne the appearance of the latter. If, on the other hand, they were heterozygotes with the appearance of the dominant, the matings should have given the result obtained, viz. a mixture of two female forms. The numerical expectation was half of the female parent form to half of the recessive *hippocoon*, and approximately half and half were obtained in 3 out of 4 of Mr. Swynnerton's families from the rarer female parents, although the numbers were unfortunately very small. The same interpretation held for Mr. Lamborn's family of approximately half *dionysus* and half *hippocoon*. If we suppose that the recessive female parent, *hippocoon*, had mated with a male carrying *dionysus* as a heterozygote, the result was in accordance with Mendelian expectation.

It had been shown that if *hippocoon* were dominant we should not expect many of this form to be heterozygotes, because of the fewness of matings with males carrying the rarer forms. But the opposite was true of these latter; for the vast predominance of the recessive would ensure that nearly all their matings would be with recessives and would produce heterozygotes. And these heterozygotes would nearly always mate with recessives producing again a mixture of heterozygotes and recessives. It might be safely assumed that these relatively rare forms bearing the appearance of a pattern dominant to the abundant *hippocoon* were nearly always heterozygotes and not true dominants, and the results obtained were in accordance with this assumption.

Mr. G. H. Hardy, F.R.S., of Trinity College, Cambridge, had written (Science, N. S., Vol. xxviii, No. 706, pp. 49–50, July 10, 1908) on the stability of Mendelian populations and had shown that whatever be the proportion between dominants, heterozygotes and recessives, equilibrium was reached in the second generation and would persist unless disturbed by selection or some other cause. His equations started from known proportions whatever these may have been. Now in *P. dardanus*,

and probably in a large proportion of cases, it was not hard to determine the proportion of apparent dominants (viz. true dominants + heterozygotes) to recessives, although it might well be laborious to ascertain the numerical relationship between true dominants and heterozygotes. I therefore asked Mr. Hardy whether his method would not give this relationship when the proportion between apparent dominants and recessives was known. Mr. Hardy had kindly replied :— " What you say seems to me perfectly correct : viz. that if the ratio of apparent dominants to recessives is observed and found to be constant, then my condition enables you to assign the ratios true dominants : heterozygotes : recessives—and your numerical illustration seems accurate."

It was probably safe to assume that on the W. Coast *dionysius*, an apparent dominant, was somewhere between 5 % and 1 % of *hippocoon*, the recessive, and that the rarer forms at Chirinda also lay between these extremes. Assuming 5 %, Mr. Hardy's equations gave almost precisely $\frac{1}{4}$ % true dominants, $4\frac{3}{4}$ % heterozygotes, and 95 % recessives. Thus with 5 % apparent dominants only 1 individual in 20 would be a true dominant. With 1 %, the proportions were almost exactly $\frac{1}{100}$ %, 1 %, and 99 % respectively; and only 1 apparent dominant in 100 would be a true dominant (homozygous).

A large family of Hypolimnas (Euralia) mima, Trim., and wahlbergi, Wallgr., bred from known parents of the wahlbergi form at Durban, by E. E. Platt.—Prof. Poulton exhibited a male and female *wahlbergi*, taken *in coitû*, on Dec. 28, 1913, by Mr. E. E. Platt, of 403 Essenwood Rd., Durban, together with a portion of the family reared from the eggs laid by the female. This was the first time that both parents of a family of this species had been secured; and the results suggested that the female may also have paired with another male of the *mima* form. It was at any rate probable that *wahlbergi* was a Mendelian recessive (Proc. Ent. Soc., 1910, p. xvi, n.), while Mr. W. A. Lamborn had in 1911, by breeding a large all-*dubia*, Beauv., family from a female of the *anthedon*, Doubl., form (Proc. Ent. Soc., 1912, p. iv), rendered it almost certain that the latter—the western representative of *wahlbergi*—was recessive. Hence from a male

and female *wahlbergi*, nothing but *wahlbergi* was to be expected, and yet Mr. Platt's family contained 104 *mima* to 94 *wahlbergi*. If therefore the previous conclusions as to the Mendelian constitution of the parents were correct, it was clear that the female must have also paired at some earlier date with a male *mima*. The emergences from the pupa, which took place on the following dates, showed a predominance of males at the beginning of the series and a predominance of females at the end :—

Dates of emergence.	*Wahlbergi*.		*Mima*.	
1914	♂	♀	♂	♀
January 31 . . .	1		2	
February 1 . . .	13		17	7
February 2 . . .	14	18	10	17
February 3 . . .	11	12	11	6
February 4 . . .	7	7	5	10
February 5 . . .	1	5	3	6
February 6 . . .		2	1	6
February 7 . . .	1	2		1
February 8 . . .				1
? date			1	
Totals	48	46	50	54

The whole of these offspring had been set and were now in the Hope Department with the exception of a male and two females of each form, emerging Feb. 2, two pairs kept for breeding and two females accidentally destroyed.

Mr. E. E. Platt had kindly written the following account of the breeding experiment :—

" *Durban,*
" *March* 24 *and* 30, 1914.

" The parents were captured on the Bluff, which as you will remember is a very well wooded locality across the Bay, and bounded on the other side by the ocean. The Euralias

had, I believe, fluttered down, paired, from an overhanging tree, and I only saw them just as they were reaching some grass, on which they rested. I put the net over them, and removed them from the grass into the box. When I closed them up they were still paired. I did not open the box until I reached home, an hour or two later, and then I found they had separated. I put the female in a cage with some food-plant, and when I looked at her perhaps a couple of hours after (about 5 p.m.) I found she had commenced laying. It struck me at the time I took the parents, that they had been disturbed on the tree, as they seemed to drop, rather than fly down, and there only appeared to be sufficient movement of the wings to ensure a safe landing. I consider the pairing was quite definite and effective, but I was rather surprised that the eggs should be laid so soon after. It is a fact which, as it seems to me, lends colour to your suggestion that the ova may be the result of a previous pairing, if such a thing occurs."

"*Feb.* 7, 1914.

"The female commenced to lay on the day of pairing, Dec. 28, 1913, and continued until Jan. 3, when I killed her, as the young larvae were coming out, and the parent was getting badly battered. Some of the young larvae escaped, as some eggs were laid on the perforated cylinder. Considering this, and the fact that the parent was killed before the whole batch was laid, I think the brood might have totalled nearly 300. There were 205 young larvae (in first skin), and I have sent you the whole family with the following omissions : One each male and female *wahlbergi*, one each male and female *mima* kept for breeding purposes, and one female each *wahlbergi* and *mima* accidentally crushed before wings were expanded. These six emerged Feb. 2.

"The first larva pupated Jan. 21, the larval state thus lasting 18 days, and it was 10 days in pupa. The food-plant has been identified by Mr. Medley Wood as *Fleurya capensis*.

"Emergence took place between the hours of 7 a.m. and 5 p.m. : the majority came out between noon and 3 o'clock. The butterflies *always* rested in a vertical position at night; head downwards. [March 24, 1914.]

"My previous breeding experience with the species has been as follows:—From 27 larvae from a *mima* female I bred 13 *mima* and 13 *wahlbergi*; while 17 larvae from a *wahlbergi* female resulted in 15 imagines, all of the *wahlbergi* form. In each case the male parent was unknown."

Mr. Platt also sent the following interesting notes of his own and of Mr. H. A. Green on the habits of these Euralias. The observations differ in some respects from those recorded by Mr. G. F. Leigh (Proc. Ent. Soc., 1906, pp. liii–lviii).

"*March*, 30, 1914.

"I believe that both forms *mima* and *wahlbergi* appear throughout the year, and in about equal numbers. My experience, however, only covers the months Jan. to April on the Bluff, as I have not visited that locality in the winter months (dry season). I have, however, obtained the following dates of captures from Mr. H. A. Green, F.E.S.:—

E. wahlbergi.	*E. mima.*
January 1904.	June 1903.
April 1904.	April 1904.
May 1904.	June 1904.
December 1904.	May 1904 (var. A).
February 1905.	December 1904.
March 1905.	

"*Mima* is certainly the more likely to be overlooked, as species with a similar pattern are so common. *Wahlbergi* also always appears to court observation, and is visible at a distance. But of course we should have to inspect closely a suspected *wahlbergi* to make sure it was not *Euralia deceptor*, Trim., or *Amauris dominicanus*, Trim., which latter is rather a rare species except on the Bluff, where, however, it is outnumbered by *wahlbergi*.

"*Wahlbergi* flies more than *mima*. It floats about in the sunshine exactly in the manner of *dominicanus*, while *mima* is often found settled in shady places, and, when disturbed, flies a short distance rapidly and settles again. It appears to use its wings as a means of locomotion only, while *wahlbergi* seems to fly for the pure love of the thing.

" Mr. Green is of opinion that both forms occur in practically equal numbers throughout the year, and he has given the following record of some gatherings of *wahlbergi* that he has witnessed.

" ' Mr. Harold Millar told me to-day that he saw, towards sundown, a large batch at Isipingo last August (before the 15th). He was out buck-shooting and so could not capture any. The butterflies were apparently newly emerged, settled in little groups under the leaves of bushes. Both forms were represented and in about equal numbers. The food-plant was near, and larvae were seen. I mention this all fully, as it does not seem to be an assemblage of the same character as that mentioned by Mr. Green, comprising *wahlbergi* only.' "

Mr. H. A. Green, of 168 Point Road, Durban, kindly supplied the following information upon the habits of *wahlbergi* and *mima*. His observations were made in the Durban district, and the note is dated March 31, 1914.

" As far as my observations regarding predominance of either form, during the seasons in which they appear, have carried me, I can only say that *wahlbergi*, being far more conspicuous, is apparently the more numerous. *Mima*, owing to its greater resemblance to such species as *Papilio brasidas*, the *cenea* ♀ of *P. dardanus* [and their Danaine models], is not so noticeable, but I have taken them in almost equal numbers. I may mention regarding *E. wahlbergi* that sometimes on the Bluff when out collecting, I have seen them congregate in large numbers on one tree, sometimes as many as twenty or thirty sunning themselves together. On one occasion out of curiosity I tried to see how many could be taken in one sweep of the net, and I captured ten. *Mima* I have never seen congregate in this way."

The assemblages recorded by Mr. Guy A. K. Marshall (Trans. Ent. Soc., 1902, pp. 491, 492) contained both forms as shown in an exhibition to the Entomological Society in 1906 (Proceedings, pp. liii, liv). In conclusion Prof. Poulton hoped that it would soon be possible to breed either the eastern or the western Euralias through some generations and thus settle finally the Mendelian relationships. It was all the more necessary that this should be accomplished

because of the doubts raised by Mr. E. E. Platt's striking results as well as by Mr. W. A. Lamborn's observation that the West African forms were largely seasonal in appearance.

Description of the early stages of three S. and E. African Danaine butterflies.—Prof. Poulton exhibited bred imagines and pupal cases of *Amauris ochlea*, *A. echeria*, and *A. albimaculata*, and blown larvae of the first- and last-named. Mr. E. E. Platt, to whom we owed the following descriptions, had kindly sent these specimens for exhibition to the meeting.

Amauris ochlea, Boisd.

Ovum.—Straw-colour, upright, ribbed longitudinally. Laid generally singly, but sometimes two or three, on underside of leaf.

Adult larva.—Velvety black, spotted with white. On segments 3*, 4, 6, 11, and 12 five pairs of long black filaments, bearing a whitish wedge-shaped streak on each side of the base. The terminal hooks are directed outward and forward. The filaments of the first pair are slightly longer and less hooked than the others. A dorsal series of white spots, commencing as an interrupted line on segment 3. The remainder of dorsal area peppered with small white spots of irregular shape and varying size. A superior lateral irregular line of white spots. Each spiracle preceded and followed by a white spot. A sub-spiracular festooned series of white spots. Ventral surface light brown with whitish markings. Head shining black. Legs light brown.

Amauris echeria, Stoll.

Adult larva.—Dull black with pale blue and yellow spots. Dorsal line bluish bordered with brown-black and succeeded by a line of yellow spots intersected with blue spots. Subdorsal area black, *with a pale blue spot on segments* 5, 7, 8, 9, 10. Superior lateral line of yellow and blue spots. Spiracles more or less lunulated with white. Inferior festooned interrupted yellow line. The blue spots occurring in the yellow lines and in subdorsal area are placed over each other to form a

* The head being counted as the first segment.

transverse series. The filaments on segments 3, 4, 6, 11, 12, are of about the same length as in *ochlea*, but gradually decreasing posteriorly. They are black, with a bluish white line at each side of the base. The terminal hooks of the first pair, the longest, point forward, those of the second and third forward and outward, of the fourth outward, and of the fifth backward. The ventral surface is dirty greenish. Head black, with inner margins of lobes edged with grey.

An adult larva taken Jan. 10, 1914, pupated Jan. 14, and emerged Jan. 27.

Amauris albimaculata, Butl.

Ovum.—Ochreous, upright, ribbed longitudinally. On the two occasions on which I have found these ova, they have been laid, in batches of about 20, along the midrib on the underside of the leaf.

Adult larva.—Velvety black, with a very narrow bluish median dorsal line, running between the two dorsal series of yellow and greenish spots. Subdorsally black. (The white streaks on the abdominal segments of a blown specimen do not show in the living larva.) Superior lateral line of small blue and yellow spots. Spiracles outlined with blue. Inferior festooned line of yellow markings. Ventrally grey-brown with yellowish spots and lines on segments 5–10. Head black. Filaments on segments 3, 4, 6, 11, 12 are *short* (in comparison with *ochlea* and *echeria*) and black. Terminal hooks of first four pairs bent forward, the last pair almost straight and hookless.

A larva which hatched Dec. 30, 1913, pupated Jan. 13, and emerged Jan. 25.

Varieties of the Cantharid beetle Mylabris fasciata, Oliv., captured together in Southern Nigeria.—Prof. Poulton exhibited 36 *Mylabris fasciata* taken on Sept. 24 and 26, 1913, at Moor Plantation, near Ibadan, by Mr. W. A. Lamborn. The series was sharply divided into a light section containing 28 individuals and a dark section containing 8.

The light section.—The lightest individuals were black with a broad orange zone across the centre of the elytra, occupying about half their total length. From these, of which there

were only 2 without any trace of median black, there was the most gradual transition in the development of a central black band which, if complete, would have divided the orange zone into two bands, one anterior and one posterior. Nine examples exhibited a very faint trace of this median black band, especially developed, and often only developed in a *very* slight degree, in the median dorsal region or at the lower margins of the closed elytra, or in both these situations. In the remaining 17 specimens the development was stronger, and, in many, the median dorsal mark extended to a varying distance downwards over the surface of the elytra. In some individuals this lateral extension was in part represented by a detached spot. In none was the central black band complete.

The dark section.—The pattern of these examples might be explained by so great a development of the central black band that only traces, more or less distinct, of the orange zone were left, indicating the position of its anterior and posterior border or one of these. In 2 examples the posterior border of the zone was represented by a roundish orange spot on each side of and near the middle line, in one by a larger spot and a detached curved orange mark rather lower down on the surface of the elytra. In these 3 beetles there was no trace of the anterior border of the orange zone. In a fourth specimen, otherwise similar to that last described, the anterior border was represented by a small spot on each side near the mid-dorsal line. In the fifth and sixth specimens these anterior spots were larger than the posterior, which latter were minute in one, and small in the other. A minute lateral spot was seen below the anterior marking on the right side of one specimen and two on its left side, where the small posterior spot was also double. In the seventh and eighth specimens both borders of the orange zone were represented by well-marked bands, which, however, did not reach the lower border of the elytra.

There was thus great and transitional variability at each end of the scale, although there was no transition connecting one end with the other. Interesting results might be obtained by observations directed to test the existence of selective pairing.

A family raised by W. A. Lamborn from parents belonging to two forms of West African Pyrrhocorid bugs.—Prof. Poulton exhibited two Pyrrhocorid bugs captured *in cop.* by Mr. W. A. Lamborn, Nov. 19, 1913, at Moor Plantation, near Ibadan, S. Nigeria. The male was the uniform, patternless, dull ochreous insect known as *Dysdercus melanoderes*, Karsch, while the female exhibited the conspicuous pattern of *D. superstitiosus*, F. Mr. Lamborn had informed him that all the 11 offspring which he had succeeded in rearing were of the same form as the female parent, viz. *superstitiosus*. The eggs began to hatch on Nov. 26. Nine out of the 11 had been received from Mr. Lamborn and were exhibited to the meeting. Three of them had been sucked dry by the others, one having been attacked while changing its skin, while the other two had apparently fallen victims when in a soft condition soon after ecdysis. The first specimen reached maturity on Dec. 23, the last died on Jan. 20. All 9 offspring were females. The sexes of some of the specimens were rather difficult to determine with precision and Prof. Poulton had therefore submitted the series to Miss Foot, who has had a long and intimate experience in the breeding of Hemiptera.

The results described above suggested the possibility that *melanoderes* might be the male of *superstitiosus*—a conclusion negatived by the fact that both sexes of each form had been captured by Mr. Lamborn and were also present in the collection of the Natural History Museum. Some of these latter specimens were in very poor condition, but Prof. Poulton believed that there were 7 males and 4 females of *melanoderes*, 3 males and 12 females of *superstitiosus*. The reversal of proportions might be significant. Mr. Lamborn had written Nov. 26, 1913 : " *Superstitiosus* occurs in thousands on cotton, but hitherto *melanoderes* has been comparatively rare."

The experiments were well worth repeating on a larger scale and extending, if possible, over a series of generations. Until this was done any further discussion of the results was premature.

Euliphyra sjöstedti, Auriv., a correction.—Prof.

Poulton desired to correct the statement on p. 506 of Trans. Ent. Soc., 1913, that *E. sjöstedti* was "almost certainly a Southern geographical race of *E. mirifica*," Holl. The description of figs. 8 and 9 of the accompanying Plate XXVII also needed corresponding correction. The specimen described in the second paragraph on p. 506 had been wrongly named "*sjöstedti*" in the collection of the British Museum, and Prof. Poulton blamed himself for having been misled. The error had been pointed out to him by Prof. Aurivillius, who detected it on an inspection of Plate XXVII. The figure in Ent. Tidskr., 16, p. 204, was almost precisely the same as figs. 3 and 4 on Plate XXVII, thus showing that *sjöstedti* was a synonym for the female of *E. leucyania*, Hew.—a conclusion to which Prof. Aurivillius had come directly he saw the plate.

The above note, prepared for June 3rd, was accidentally overlooked, so that it was not read to the meeting.

Prof. Poulton also wished to correct an error for which he was responsible on p. 616 of Dr. G. D. H. Carpenter's paper in Trans. Ent. Soc. 1913. Kerinya was not the name of the isthmus connecting the two sections of Bugalla Island, but of a small peninsula projecting into the Victoria Nyanza at Jinja.

Paper.

The following paper was read:—

"Notes on the Life-History of *Papilio demolion*," by Margaret E. Fountaine, F.E.S.

Wednesday, October 7th, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the Chair.

Election of Fellows.

Dr. Leslie C. Coleman, D.Sc., Dept. of Agriculture, Bangalore, Mysore, India, and the Rev. Frederic S. F. Jannings, Warmsworth Rectory, Doncaster, were elected Fellows of the Society.

Exhibits.

Abnormal Neuration in Melitaea aurinia.—Mr. O. E. Janson exhibited an abnormal specimen of *Melitaea aurinia*, taken in Kent, in which six of the nervures were almost symmetrically deficient on either side, causing an alteration in the usual form of the sub-marginal lunular black markings, and giving it a very distinctive aspect.

Chloroperla venosa, Steph., and C. grammatica, Poda.—Mr. G. T. Porritt exhibited a series of *Chloroperla venosa*, Steph., taken by Prof. Carr and Mr. Mottram on the river Trent, near Nottingham; also a series of *Chloroperla grammatica*, Poda, for comparison.

Abnormal Hymenopteron.—The Rev. F. D. Morice exhibited a specimen of *Crabro* (*Lindeinus*) *albilabris*, F., ♀, with abnormal ocelli; one wanting, and the others misplaced.

Ova of Arge pagana.—He also exhibited a photograph, from nature, of eggs *in situ*, laid in a rose-stem *in a double row* by Vallisnieri's "Mosca dei Rosai," *A. pagana*, Panz., exactly as in the author's original figure.

Mr. C. B. Williams observed that there exists a Thysanopteron the individuals of which vary between having two and three ocelli, but that in this case no change occurs in the position of the other two where one is absent.

Gynandromorphous Plebeius argyrognomon, etc., from Switzerland.—The Rev. G. Wheeler exhibited a gynandromorphous specimen of *Plebeius argyrognomon* taken by him in the Val Maggia on July 13 this year. It was exactly halved, the right wings being ♀, the left ♂. The body was also halved, the external characters of both sexes being present, the ♂ half of the body extending considerably beyond the ♀. Also an extreme example of ab. *persica* of *Polyommatus icarus* taken on the marshes at Altmatt, on July 11, and a ♂ of *Pararge maera* with symmetrical deeply concave costa of both fore-wings, taken on the Via Mala on July 17. He also exhibited a well-marked series of *Pieris manni* from Vernayaz, taken on July 5 this year, the occurrence of *P. manni* in Switzerland having been disputed.

Rumicia phlaeas, etc., from North Kent.—Mr. Prideaux

brought for exhibition a very perfect example of *Rumicia phlaeas*, ab. *schmidtii*, of a pale yellow colour, like the original ab. *schmidtii*, which was not white; also, a ♂ *Polyommatus icarus*, ab. *obsoleta*, and some very blue ♀♀ of the latter species, all taken in the neighbourhood of Brasted, N. Kent.

Platyphora lubbocki, Verrall, and Aenigmatias blattoides, Meinert, one species.—Mr. Donisthorpe exhibited specimens of *Platyphora lubbocki*, Verrall, and *Aenigmatias blattoides*, Meinert, which he had reared in a nest of *Formica picea*, Nyl., taken in the New Forest in July last. He pointed out that he believed he had proved that these two flies were the ♂ and ♀ of the same species. This had been suggested by Mik in 1898, but considerable doubt had been expressed on the point, and indeed Mik did not give any reason for his supposition. He gave the following history of the two sexes: In 1877 Verrall described *Platyphora lubbocki* (a new genus and species) on a single specimen bred by the late Lord Avebury in one of his ants' nests, the host, however, not being mentioned. On July 6 Dr. Wood captured a specimen in Stokes Wood near Hereford, and in 1909 J. J. F. X. King took another in the New Forest. In 1913 (on July 11 and 26) I bred two specimens in my *F. sanguinea* nest; these I exhibited at a meeting of this society and said they had probably been bred from pupae of *F. fusca* given to the *sanguinea* nest as slaves. Mr. Edwards, however, tells me that they are not the same species as the *picea* ones (and they may be *P. dohrni* the ♂ of *Aenigmatias dohrni*, Enderlein, and bred from *F. rufibarbis* pupae which were also given to the nest from Weybridge, but we will return to this shortly). I have bred some twelve specimens from my *picea* nest this year. *Aenigmatias blattoides* was described by Meinert in 1890 from two specimens taken with *F. fusca* at Copenhagen in 1908, Wasmann bred two specimens in a *Formica exsecta* nest at Luxemburg from *F. fusca* cocoons (and he also recorded others from *F. rufibarbis* nests, but Father Schmitz tells me these are *A. dohrni*, Enderlein); on July 21, 1912, I captured a specimen in a *fusca* nest at Nethy Bridge, and this year I have bred some seven specimens from my *picea* nest.

Aenigmatias dohrni was described by Enderlein in 1908

from a specimen taken in a colony of *Polyergus rufescens* in Bayern, and as we have seen Wasmann took specimens with *F. rufibarbis* at Luxemburg. It is probable that the slaves in the *Polyergus* colony were *rufibarbis*. On July 4, 1914, I took a *Platyphora* in a *rufibarbis* nest at Weybridge, which is probably the ♂ of *A. dohrni* which will now become *Platyphora dohrni*.

When investigating the nests of *Formica picea* in Matley Bog in July I noticed a number of small Dipterous pupae which I collected and brought home, introducing them into my nest of *F. picea* (which I had obtained in June in the same locality and had fixed up a very large glass bowl with a large block of growing sphagnum) with more *picea* queens, workers and brood. On July 14 I captured an *Aenigmatias* in this nest and a day or two before I had observed a *Platyphora*. This made me think of isolating some of the Dipterous pupae in a small plaster cell. From these I bred both *Platyphora* and *Aenigmatias*, as well as further specimens in the nest itself. This seems to me to prove that they are the ♂ and ♀ of the same species.

Mr. J. E. Collin called attention to the great importance of this piece of work and warmly congratulated Mr. Donisthorpe on the industry and patience which had accomplished it.

Mr. Donisthorpe also exhibited photographs of the nest of *F. picea*.

Noteworthy Lepidoptera.—Mr. L. W. Newman exhibited:—(1) A curious gynandromorphic *Polyommatus icarus*, the right fore-wing being ♀ and the remaining three wings ♂ except for one orange lunule on each of the hind-wings; this specimen was the property of Lt. T. V. Bartley Dennis and taken by him some years back. (2) A curious Zygaenid of doubtful species, being small and having four spots only, and hairy body, taken on Sept. 3, 1912, in Kent, by Mr. Grant of Gravesend, who pointed out that *Z. filipendulae* is the only Zygaenid which he had seen in the district. (3) A short series of *Epienaptera ilicifolia*, bred from the wild ♀ taken May 1913 at Cannock Chase by Mr. Oliver. This wild ♀ laid many ova, most of which were infertile and

very few were reared; of these most were spoilt in trying to obtain pairings, two pairings were obtained and plenty of ova, of which only seventeen hatched; the resulting larvae died off in all moults, four only reaching the last skin; these also failed to pupate, so that the race was now extinct. (4) A pair of beautiful *Neuria saponariae* from the Cork coast, the ground-colour being a rich pink instead of the usual yellowish colour.

Papers.

The following papers were read :—

" Contributions to the Life-History of *Polyommatus eros*," by T. A. Chapman, M.D., F.Z.S., F.E.S.

" Parthenogenesis in Worker-bees at the Cape," by R. W. Jack, F.E.S.

" Description of New Species of *Catasticta*," by W. F. H. Rosenberg, F.E.S.

" Revision of the Species of the Genus *Odynerus* (Hymenoptera) occurring in the Æthiopian Region," by G. Meade-Waldo, M.A., F.E.S.

" Some Remarks on the Coccid Genus *Leucaspis*, with Descriptions of two New Species," by E. Ernest Green, F.E.S.

Wednesday, October 21st, 1914.

The Hon. N. C. Rothschild, M.A., F.L.S., F.Z.S., Vice-President, in the Chair.

Election of Fellows.

Messrs. L. D. Cleave, Dept. of Science and Agriculture, Georgetown, British Guiana, and J. R. Menon, B.A., Trichur, Cochin State, South India, were elected Fellows of the Society.

Obituary.

The death was announced of Mr. William Warren, M.A., F.E.S.

Exhibitions.

Abnormal Anthrocerids.—Dr. T. A. Chapman exhibited three abnormal specimens of Anthrocerids, and read the following notes :—

I have brought a specimen of *Anthrocera anthyllidis* taken this summer at Gavarnie, with the left mesothoracic tarsus triplicated. Such specimens have not unfrequently been recorded in Coleoptera, but a considerable search in 1910 failed to find any such instance in Lepidoptera, so that specimens are of extreme rarity. My explanation was then, and remains so still, that the legs of Coleopterous specimens all pass under review, but those of Lepidoptera are rarely noticed.

In this specimen, the anterior of the three tarsi is practically normal, the next two have a broad first joint in common, but the following four joints are nearly normal. Notwithstanding the first joint common to two of the tarsi, the rule of orientation in such specimen pointed out by Bateson seems to hold. As the specimen is set the first and second tarsi are venter to venter, the second and third dorsum to dorsum. I have detected no other abnormality about the specimen. A photograph of the tarsus is reproduced on Plate A.

I show with it a specimen of *A. exulans* taken at Oberalp some twenty years ago, which has an abortive wing beneath the left anterior wing, and not only this second but even a trace of a third anterior wing beneath the second.

Also a specimen of *A. achilleae* from Zermatt that has symmetrical depressions of the costa of the same character as those in the specimen of *Pararge maera* shown Oct. 7 by Mr. Wheeler.

The nervures are all present as in a normal specimen. I had ranged this specimen as of congenital causation and not as a result of any injury.

Variation in Dianthoecia barrettii and Boarmia repandata.—Mr. L. W. Newman exhibited a long and varied series of *Dianthoecia barrettii*, bred from wild larvae collected in Co. Cork, and dug pupae from S. Devon. In the Irish form melanic specimens were rare, but in the Devon they were more abundant. A striking point was that the Devon dug pupae had produced, as a series, smaller specimens than the Irish. In the Devon series were three specimens showing an ochreous colour, this form not appearing in the Irish specimens.

Also a series of *Boarmia repandata*, all bred from wild

Photo A. E. Tonge. *Half Tone Eng. Co., Ltd.*

LEFT METATHORACIC LEG OF ANTHROCERA ANTHYLLIDIS.

[× 18]

larvae collected from a very small radius in the Wye Valley, the range of variation being startling, comprising melanic specimens equal to the darkest from Sheffield, very pale ones like some Scotch forms, var. *conversaria*, and almost every intermediate form. Accompanying these was a series of the same insect from wild larvae taken in north Cornwall, showing considerable variation.

Hybrid Amorpha populi and Smerinthus ocellatus.—Mr. A. E. Tonge exhibited a specimen of the hybrid *A. populi* ♂ × *S. ocellatus* ♀, bred *ab ovo*, which emerged Sept. 11, 1914. A pairing had been obtained by Mr. T. H. L. Grosvenor of Redhill in May 1913. About 40 ova were laid but only one hatched, the resulting larva pupating in August 1913, thus having passed about 13 months in the pupal state. Mr. Tonge said he was informed that this was the first larva from this crossing which had hatched normally, the few others that had been obtained having been released artificially from the egg-shell.

Aberrant Rumicia phlaeas.—Mr. Tonge also exhibited a specimen of *R. phlaeas*, taken on Deal Sandhills in Sept. 1914, without the red marginal band on the hind-wings.

Stylopised Sand-wasp.—Mr. G. Meade-Waldo exhibited a stylopised specimen of the Sand-wasp, *Ammophila tydei*, Guill., from South Africa. There were no less than 7 Stylops parasitic on it, the result being that the abdomen presented a very distorted appearance. He drew the attention of Fellows to the valuable paper on Stylops and stylopisation recently published by Geoffrey Smith and A. H. Hamm (Quarterly Journal of Microscopical Science, Sept. 1914) in which some interesting and important conclusions were arrived at, and were summarised as follows :—

(1) Despite the existence of active winged males fertilisation cannot occur and development is always parthenogenetic.

(2) The effect of the parasite on internal genital organs is slight, leading to a reduction in size of ovaries to ¼ normal size, while the testes are unaffected.

(3) The effect on secondary sexual characters is slight, the scopa is generally reduced in the ♀, whilst in the ♂ the punctuation may be increased.

(4) The most striking effect is noticeable in certain species of *Andrena* (*A. labialis* and *A. chrysosceles*) in which the ♂ normally has a yellow clypeus and the ♀ a black one. Stylopisation may lead in these cases to a ♀ assuming a yellow clypeus as in the ♂, and the ♂ may lose the yellow and acquire a partially black clypeus.

South European Butterflies.—Mr. E. B. Ashby exhibited some South European butterflies, chiefly from the south of France, including *Melanargia galathea* var. *procida* and ab. *leucomelas*, another aberrant *Melanargia* from Barcelona showing characters both of *M. galathea* and *M. lachesis*, *Polyommatus admetus*, var. *rippartii*, from Clelles where it had been taken this year by the exhibitor and Dr. Keynes, the most northerly locality recorded, and *P. meleager* with blue ♀ from Digne, whereas all the ♀♀ from St. Martin-Vésubie were of the brown form ab. *steeveni*.

Mr. Rowland-Brown remarked that as a rule the ♀♀ of *P. meleager* were brown at higher elevations, whereas at Digne the two forms were about equally numerous.

The Rev. G. Wheeler observed that farther south at Roccaraso in the Abruzzi he had found only the blue ♀♀, at a height of over 4000 ft.

Xanthic Psilura monacha.—Mr. Rippon exhibited a variety of *P. monacha*, which, as far as he had been able to ascertain, had not been previously recorded. The variation consists in the body being banded with black and *yellow* instead of black and *crimson*. The examples exhibited were bred by him this year from a strain that he had had going for two or three years with the object of increasing the black wing coloration. He judged that possibly one-third of one brood were of the yellow variety, but unfortunately was unable to give any exact figures as he did not observe the yellow form till most of the brood had emerged.

Triphaena Fimbria. — Mr. Rippon also exhibited five specimens of *Triphaena fimbria*, bred from Pamber Forest larvae, one of which showed a tendency to melanism even in the hind-wings, and the others showing some modification of the two usual forms.

South Russian Heterocera.—Mr. A. H. Jones exhibited

a number of moths from Sarepta, and read the following notes :—

Sarepta, where I collected with Mr. W. G. Sheldon from the middle of May to the end of June, is situated on the Volga about 300 miles from the Caspian Sea, which lies in a south-easterly direction. Although in the same latitude as Orleans in France, the winters are far colder—for the Volga is then frozen over—and the summers far hotter; these extremes may have some influence in producing the interesting forms which are there found, being in some cases larger and more highly coloured.

In the immediate neighbourhood of Sarepta the ground is perfectly flat, but as one approaches the railway line about a mile distant there is a range of hills with an elevation of about 300 ft. which follow the Volga northwards for many hundreds of miles. They may be described as "sand dunes," which they really are, covered with vegetation of a scanty nature, chiefly a species of *Artemisia*—the sand, however, in places comes strongly in evidence. These hills are intersected by numerous ravines similar to those we are so familiar with in Spain, formed by the water draining the tableland above.

These "dunes" are known by the Russians as "steppes." On the wind-swept tableland above—from which I may incidentally mention there is a grand view of the Volga with its numerous channels and islands—there is little lepidopterous life beyond a few wandering *Colias* and that beautiful geometer *Aspilates mundataria*. It is in the sheltered ravines, in which a more varied flora has established itself, that lepidopterous life becomes plentiful. The ravines are the homes of the moths here exhibited—in the woods they are not so abundant. It was in the forests, the "Tschapurnik Wald," for instance, which is some miles in extent, where butterfly life was so abundant—in the open spaces three or four species at once were to be seen in the utmost profusion. For a parallel one must visit a Swiss meadow in June. This forest gave one the impression of a very ancient one, to judge from the size of the oak and other trees, and is possibly the remnant of a forest in the distant past, which covered a large area of that portion of south-east Russia.

Two factors, I think, may explain in a measure the reason of the amazing abundance of lepidopterous life; first, complete hibernation, and secondly, the comparative scarcity of small birds, owing to the number of birds of prey,—buzzards in particular, and day-flying owls.

The moths I have brought here were taken chiefly in the ravines, and the long stretch of uncultivated land bordering the railway line. Out of the 31 species of *Heterocera* taken 12 occur in Britain, viz. *Malacosoma castrensis*, *Heliothis dipsacea*, *H. scutosa*, *H. peltigera*, *Emmelia trabealis* (*sulphuralis*), *Thalpochares paula*, *Acidalia similata* (*perochraria*) commonly, *A. marginepunctata* (*promutaria*), *Ematurga atomaria* (an undescribed form), *Boarmia consortaria*, *Phlyctaenodes verticalis* and *P. sticticalis*. That rarity in Britain, *H. scutosa*, was excessively abundant flying in the hot sunshine in marshy ground. That beautiful genus *Acontia*, of which we have only one representative in Britain, *luctuosa*, was well represented in *titania* and *lucida*. I took but one example of that beautiful species *Thalpochares purpurina*, and *T. parallela*, an eastern species, deserves mention, as also *Euclidia triquetra*, allied to our *E. mi*. One was not surprised, with the ground carpeted with *Artemisia*, to find *Euchloris smaragdaria* (v. *volgaria*), a variety according to Staudinger, but Mr. Prout considers *volgaria* a good species. *Siona nubilaria* v. *exalbata*, another eastern species, was extremely local and occurred in only one ravine, where it was very abundant. *Phasiane glarearia* and *Eubolia arenacearia* occurred singly; *Aspilates mundataria* was generally distributed; *Phlyctaenodes sulphuralis* occurred singly; but *P. verticalis*, *P. sticticalis* and *Cledeobia connectalis* were common. That beautiful Pyrale, *P. clathralis*, was by no means scarce; *Syntomis phegea* occurred singly, and so did that beautiful species *Macroglossa croatica*.

Lycaenids showing some degree of Gynandromorphism.—Dr. E. A. Cockayne exhibited :—

(*a*) Thirty-eight gynandromorphous *Agriades corydon* from Royston. One, taken in 1910 by the Rev. G. H. Raynor, has the right fore-wing very minute but thickly sprinkled with blue scales, and amongst them eight androconia were

seen, the right hind-wing has some wedge-shaped white markings and a few scattered blue scales; the left side is uniformly dark brown.

Thirty were taken in 1913, all are predominantly female, but have the wings on one side smaller than those on the other, and more or less dusted with blue scales, coarse bluish hair scales and androconia. The right side is smaller in 21, the left in 9.

One taken in 1913 has scattered blue scales and androconia on both sides, though predominantly female.

Six taken in 1914 are similar and are fully described in the Ent. Record, Oct. 1914. The primary and secondary sexual organs were purely female in character.

(*b*) Two ♀♀ of *A. corydon* from Royston showing streaks of blue. Neither showed any signs of androconia.

(*c*) One gynandromorphous *Polyommatus icarus* (Co. Clare, 1914), predominantly female ab. *caerulea*, but with streaks of male colour on the right fore-wing and both hind-wings. These showed androconia as regularly arranged and numerous as in areas of the same size and situation in a normal male.

Paper.

The following paper was read :—

"On Hawaiian *Ophioninae* (Hymenoptera, Fam. *Ichneumonidae*)," by R. C. L. Perkins, M.A., D.Sc., F.E.S.

Wednesday, November 4th, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the Chair.

Election of Fellows.

Mr. Alleyne Leechman, M.A., F.L.S., F.C.S., of Corpus Christi College, Oxford, and St. Hubert's, Main Street, Georgetown, British Guiana; Dr. T. Miyaké, the Agricultural College, Tokyo Imperial University, Komaba, Tokyo, Japan; and Mr. George W. Murray, Dirimu Estate, Binaturi River, Daru, Papua, were elected Fellows of the Society.

Reply to the Declaration of the German Professors.

The PRESIDENT said that he had received a letter from Prof. Poulton, saying that the reply made by many of the British University Professors to the declaration against England issued by German Professors was being brought before the various Scientific Societies in England, with a view to its being formally endorsed by them. He read in full both the Declaration and the Reply, and proposed the following motion :—

" That the Officers, Council, and Fellows of the ENTOMOLOGICAL SOCIETY OF LONDON, assembled at their meeting on November 4, 1914, desire to be associated with the statements and expressions of opinion by certain scholars and men of science as published in the *Times* of October 21, 1914, and that notice of this resolution be sent to the Press."

He added that this motion had already been placed before the Council, which had unanimously recommended it for adoption by the Society.

Prof. POULTON, in seconding the motion, said that he believed the reply expressed the almost unanimous opinion of men of science in this country, and that even if there were observations contained in it which individual Fellows, or even Societies, would have preferred to see expressed somewhat differently, it was far better that they should associate themselves with an already published form of reply, with which they were in general agreement, than that each Society should formulate its own reply, and thus lose by diffusion a part of the weight which would be gained by cohesion. He also observed that the name of our Honorary Fellow, Prof. Weismann, was appended to the German Declaration.

Dr. MALCOLM BURR asked to be allowed to support the resolution. Speaking as Honorary Secretary of the International Congress of Entomology, and as a student of European affairs for many years, he was glad to associate his name with a resolution in support of a manifesto which was as correct as it was eloquent.

Mr. H. ROWLAND-BROWN, who had been unable to attend the Council meeting, also supported the motion, and mentioned

the somewhat similar attitude adopted by the Entomological Society of France.

The motion was carried unanimously.

The Declaration and Reply are here reproduced in full.

Declaration by German Professors and Men of Science.

England has declared war upon us under a hollow pretext which is least of all justified in view of English history, and the true character of which is laid bare by numerous documents. Although England is related to us by blood and race it has, out of a contemptible envy of Germany's economic success, incited other peoples against us for years; and, in particular, it has allied itself with France and Russia to crush us as a world-power and to endanger our cultural achievements.

It was only because they were able to reckon on England's co-operation that Russia, France, Belgium and Japan threw down to us the gauntlet of war. England bears, foremost of all, the moral responsibility for this conflagration of the nations, which will result in frightful suffering for millions of men and will demand unheard-of sacrifices of blood and treasure. England's brutal national selfishness has placed an indelible blot upon its name.

We are well aware that very eminent English scholars, with whom German men of science have for years been in friendly and fruitful relations, were opposed to this war, so wantonly begun, and spoke against it.

Nevertheless, those of us who have received marks of distinction from English Universities, Academies, and societies of scholars do renounce, as a matter of national feeling, all such honours and the rights attached to them.

Reply to the Declaration of German Professors.

We see with regret the names of many German professors and men of science, whom we regard with respect and, in some cases, with personal friendship, appended to a denunciation of Great Britain so utterly baseless that we can hardly believe that it expresses their spontaneous or considered opinion. We do not question for a moment their personal sincerity when they express their horror of War and their

zeal for "the achievements of culture." Yet we are bound to point out that a very different view of War, and of national aggrandizement based on the threat of War, has been advocated by such influential writers as Nietzsche, von Treitschke, von Bülow, and von Bernhardi, and has received widespread support from the press and from public opinion in Germany. This has not occurred, and in our judgment would scarcely be possible, in any other civilized country. We must also remark that it is German armies alone which have, at the present time, deliberately destroyed or bombarded such monuments of human culture as the Library at Louvain and the Cathedrals at Rheims and Malines.

No doubt it is hard for human beings to weigh justly their country's quarrels; perhaps particularly hard for Germans, who have been reared in an atmosphere of devotion to their Kaiser and his army; who are feeling acutely at the present hour; and who live under a Government which, we believe, does not allow them to know the truth. Yet it is the duty of learned men to make sure of their facts. The German White Book contains only some scanty and carefully explained selections from the diplomatic correspondence which preceded this War. And we venture to hope that our German colleagues will sooner or later do their best to get access to the full correspondence, and will form therefrom an independent judgment.

They will then see that, from the issue of the Austrian Note to Serbia onwards, Great Britain, whom they accuse of causing this War, strove incessantly for Peace. Her successive proposals were supported by France, Russia, and Italy, but unfortunately not by the one Power which could by a single word at Vienna have made Peace certain. Germany in her own official defence—incomplete as that document is—does not pretend that she strove for Peace; she only strove for "the localization of the conflict." She claimed that Austria should be left free to "chastise" Serbia in whatever way she chose. At most she proposed that Austria should not annex a portion of Serbian territory: a futile provision, since the execution of Austria's demand would have made the whole of Serbia subject to her will.

Great Britain, like the rest of Europe, recognized that, whatever just grounds of complaint Austria may have had, the unprecedented terms of her Note to Serbia constituted a challenge to Russia and a provocation to War. The Austrian Emperor in his proclamation admitted that war was likely to ensue. The German White Book states in so many words: "We were perfectly aware that a possible warlike attitude of Austria-Hungary against Serbia might bring Russia upon the field and therefore involve us in war. . . . We could not, however, . . . advise our ally to take a yielding attitude not compatible with his dignity." The German Government admits having known the tenor of the Austrian Note beforehand, when it was concealed from all the other Powers; admits backing it up after it was issued; admits that it knew the Note was likely to precipitate War; and admits that, whatever professions it made to the other Powers, in private it did not advise Austria to abate one jot of her demands. This, to our minds, is tantamount to admitting that Germany has, together with her unfortunate ally, deliberately provoked the present War.

One point we freely admit. Germany would very likely have preferred not to fight Great Britain at this moment. She would have preferred to weaken and humiliate Russia; to make Serbia a dependent of Austria; to render France innocuous and Belgium subservient; and then, having established an overwhelming advantage, to settle accounts with Great Britain. Her grievance against us is that we did not allow her to do this.

So deeply rooted is Great Britain's love of peace, so influential amongst us are those who have laboured through many difficult years to promote good feeling between this country and Germany, that, in spite of our ties of friendship with France, in spite of the manifest danger threatening ourselves, there was still, up to the last moment, a strong desire to preserve British neutrality, if it could be preserved without dishonour. But Germany herself made this impossible.

Great Britain, together with France, Russia, Prussia, and Austria, had solemnly guaranteed the neutrality of Belgium.

In the preservation of this neutrality our deepest sentiments and our most vital interests are alike involved. Its violation would not only shatter the independence of Belgium itself: it would undermine the whole basis which renders possible the neutrality of any state and the very existence of such states as are much weaker than their neighbours. We acted in 1914 just as we acted in 1870. We sought from both France and Germany assurances that they would respect Belgian neutrality. In 1870 both Powers assured us of their good intentions, and both kept their promises. In 1914 France gave immediately, on July 31, the required assurance; Germany refused to answer. When, after this sinister silence, Germany proceeded to break under our eyes the treaty which we and she had both signed, evidently expecting Great Britain to be her timid accomplice, then even to the most peace-loving Englishmen hesitation became impossible. Belgium had appealed to Great Britain to keep her word, and she kept it.

The German professors appear to think that Germany has, in this matter, some considerable body of sympathizers in the Universities of Great Britain. They are gravely mistaken. Never within our lifetime has this country been so united on any great political issue. We ourselves have a real and deep admiration for German scholarship and science. We have many ties with Germany, ties of comradeship, of respect, and of affection. We grieve profoundly that, under the baleful influence of a military system and its lawless dreams of conquest, she whom we once honoured now stands revealed as the common enemy of Europe and of all peoples which respect the Law of Nations. We must carry on the war on which we have entered. For us, as for Belgium, it is a war of defence, waged for liberty and peace.

Invitation to Entomologists of the Allied Nations.

The Rev. F. D. Morice then proposed the following resolution :—

" That all members of recognised Entomological Societies in the countries of our Allies, residing in or visiting this

Country, be invited during the continuance of the War to attend the Ordinary and Annual Meetings of the Society, and to make use of the Society's Library, in the same manner as though they were themselves Ordinary Fellows, except as to the right of voting."

This was seconded by Dr. Burr, and carried unanimously, the President observing that the suggestion had originally been made on behalf of the Belgians, for whom Englishmen must feel that they could not do enough, and that the invitation had been naturally extended to our other allies.

Exhibitions.

Isolated Colonies of Anthrocera (Zygaena) trifolii, and Parasemia plantaginis.—Commander Walker exhibited, on behalf of Dr. R. C. L. Perkins, specimens of *A. trifolii* and *P. plantaginis* showing the effects of isolation, and read the following notes contributed by Dr. Perkins :—

The two small series of *Zygaena trifolii* were captured in June of this year on Dartmoor. Each series is from a different colony, the distance between the colonies being only about 200 yards, and the intermediate ground is untenable by the species, as also is all the land immediately round each colony. The ground occupied by each is about 15 square yards and is very boggy, in both cases covered with rushes and in one also with Sphagnum moss.

The colonies have been observed for about five years, but are so weak, that only three or four individuals have been noticed in some seasons. This year each consisted probably of about 100 individuals, and those taken were captured on the first day of emergence. It had been observed in former seasons that the variation exhibited by these colonies was very different, but owing to their weakness they were left alone. It will be seen that the individuals from the Sphagnum-covered area (series A) are of larger average size, and either have all the spots distinct or at most the two middle ones confluent.

Those from the other colony (series B) are mostly of small size, and most of them have either the three apical spots

connected or all are confluent, or the three basal ones. In some the basal part of the hind-wings is yellowish in daylight. Although specimens were not collected after the first visit, the colonies were examined two or three times afterwards, but no example with even three confluent spots was observed in the one colony, though these continued to predominate in the second. One very windy day several specimens were made to fly, but in each case they returned against the wind to the starting-place. The cocoons were in all cases formed well up on the rushes, and therefore easily seen. All imperfections in the specimens are due to the fact that, not being a Lepidopterist, I was not equipped for collecting moths.

The series of *Parasemia plantaginis* was taken on a bare hill-side near Dorchester, where the species was very abundant on May 29 over an area of a good many acres, its distribution exactly coinciding with that of *Agriades bellargus*, whereas *corydon* ranges over the whole hill. Many of the specimens were worn, and only fresh males were captured, but all the nine ♀♀ that were seen, were taken. The latter are of interest because probably none are really typical and most of them have the black colour of the fore-wings much reduced. The hind-wings appear to have a tendency to resemble those of ♂♂, rather than those of typical ♀♀. No second colony could be found either on the same or on the neighbouring hills.

Winged "Weta."—Commander Walker also exhibited, on behalf of Mr. Morris N. Watt, of New Zealand, a photograph of a "Weta" (*Deinacrida* sp.) fully winged, the species being usually apterous. (Plate B.)

Colias erate and hybrids.—Mr. A. H. Jones exhibited a series of *Colias erate*, from Sarepta, and its supposed hybrids, with *C. hyale* and *C. edusa*. This hybridisation has long been suspected. Kane in his manual published close upon thirty years ago speaks of "ab. *Sareptensis*, Stgr., hybrid with *erate*? from Sarepta, South Russia—of deeper yellow than preceding (*hyale*), with darker marginal band extending longer and wider."

These hybrids are shown together with the cross between *C. erate* and *C. edusa*, var. *chrysodona*, Boisd., and the di-

Photo Morris N. Watt. *Half Tone Eng. Co., Ltd.*

WINGED "WETA".

morphic form of the female *erate*, ab. *pallida*, Stgr. Also from Sarepta a large form of *Anthocharis cardamines*, with an expanse of 56 mm., to which Mr. Sheldon has given the name of var. *volgensis*, and a diminutive British specimen about half the size, taken by himself at Burston, Norfolk, on June 8, 1908. Also *Plebeius pylaon*, showing the two forms of the male, and *Lycaena arion* having pronounced black dashes on fore-wing, also from Sarepta, with the Asiatic form var. *cyanecula*, Ev., of the latter species for comparison.

Meneris tulbaghia and Scarlet Flowers.—Dr. G. B. Longstaff exhibited a fine series of *Meneris tulbaghia*, L., a large and handsome Satyrine butterfly having much the appearance and habits of a Nymphaline. He said that the species was peculiar to South Africa, and was best known in the mountainous districts of Cape Colony, where it was sometimes spoken of as "the mountain butterfly," but was also known as "the Peacock," from the row of blue ocelli on the hind-wings. According to Mr. Trimen it was the sole representative of the genus, but Prof. Aurivillius considered it congeneric with *indosa*, Trim., and *dendrophilus*, Trim., insects placed by other authors in *Lethe*, which they resembled in general appearance and habits. [The same box contained specimens of *dendrophilus* from East London.] Trimen called attention to the decided liking of *tulbaghia* for red flowers, mentioning *Nerine*, *Haemanthus*, *Antholyza* and *Disa cornuta*. This was well known to Cape collectors, indeed Mr. Lightfoot had seen the butterfly settle on picked blossoms of *Nerine* lying on the ground at his side when he was sitting at lunch on Table Mountain. Dr. Longstaff had taken it on *Nerine* near George, and had seen quite a number of this lovely butterfly on the gorgeous scarlet flowers of *Vallota* in Knysna Forest. There could be no question of protective resemblance in this case, and he asked the Fellows present whether they were aware of any other like instances of butterflies showing a decided predilection for a particular colour.

The Rev. G. Wheeler said that amongst the old records of *Aricia* (*Polyommatus*) *artaxerxes*, two entomologists published observations on the fondness of this insect for blue flowers, Stewart particularising *Knautia arvensis*, blue scabious,

and Buchanan White *Lycopsis arvensis*, bugloss; in this case also there could be no cryptic resemblance, since *artaxerxes*, though one of the "blues," had not a particle of blue about it on either the upper or under side.

Mr. Simes said that at Brindisi he had noticed the special fondness of *Melanargia arge* for purple flowers.

Prof. Poulton observed that the fondness of certain Pierines for yellow flowers might be accounted for on cryptic grounds; he also mentioned Lord Avebury's observations on bees and the colour of flowers. He further said that it had been observed by Prof. Meldola that the ♀♀ of several British butterflies that carried the ♂♂ in the nuptial flight were more brilliantly coloured than the other sex.

The Rev. G. Wheeler said that he had paid a good deal of attention to this point for some years, and that the result of his experience was that in the Lycaenids the ♂ always carried the ♀, while in other Families, except the *Hesperidae*, none of which he had ever seen in flight when paired, the ♀ carried the ♂. Speaking from memory he could say with certainty that this was the case on the one hand with *Plebeius argus* (*aegon*), *P. argyrognomon*, *Polyommatus icarus*, *Agriades corydon*, and *A. thetis*, and on the other with *Dryas paphia*, *Argynnis adippe*, *A. aglaia*, *Pararge aegeria*, *Epinephele jurtina*, *Aphantopus hyperanthus*, *Coenonympha pamphilus*, *Melanargia galatea*, and the common Pierids. What had specially struck him was that he had never seen a single exception to the rule. He suggested that it was rather a matter of weight than of colour, the ♀ being generally smaller than the ♂ among the Lycaenids, whilst in other families it was usually the larger, often conspicuously so.

Mr. H. J. Turner said that in all cases that he had noticed the ♀ carried the ♂, but that he had never seen paired Lycaenids in flight.

The President entirely endorsed Mr. Wheeler's observations as to the Lycaenids, having seen the ♀ of various species carried by the ♂.

With regard to colour forming an attraction to the ♀, Dr. Cockayne commented on the fact that at Royston, where the ♂ *A. corydon* was so scarce that every specimen

was surrounded by half-a-dozen ♀♀, the other ♀♀ also pursued specimens of ab. *semi-syngrapha*, which is not uncommon there, and whose blue colour renders it conspicuous and causes an approach to the ♂ in appearance.

The PRESIDENT asked whether Dr. Cockayne's statement that every ♂ was pursued by half-a-dozen ♀♀ was a deliberate expression of opinion, to which he replied that while of course it was impossible to speak definitely of each individual specimen yet it was certainly true in a general way.

The Rev. G. WHEELER said that according to his experiences at Royston, extending over several years but not including the present year, Dr. Cockayne had greatly understated his case, and that it would have been generally true to say that the ♂♂ were a source of attraction to something more like twenty ♀♀ at a time.

THE PROPORTION OF THE FEMALE FORMS OF PAPILIO POLYTES IN NORTH KANARA.—Prof. POULTON read the following letter written June 27, 1914, by Mr. T. R. Bell from Karwar, N. Kanara, in the Bombay Presidency. He pointed out the extremely interesting difference between the proportions observed by Mr. Bell and those obtained by Mr. J. C. F. Fryer in Ceylon (Phil. Trans. Roy. Soc. ser. B, vol. ccix, pp. 227-254).

"I have got your letter about *polytes*. I have bred thousands of them, of course; and, among all these, I have never yet got a single specimen of [the male-like] female *cyrus*. The two other forms of the female, the one like *hector* and the one like *aristolochiae*—they are called *romulus* and *polytes*, I think, are they not?—are equally common, perhaps the *romulus* (*hector*-like) the commoner of the two. I am at present breeding some for you; there are about thirty pupae, and I expect to be able to get you a few hundred as you desire. I once and only once managed to *catch* a *cyrus* female; I have got her in my collection as a very rare and desirable beast. It is funny that these regions should not yield any *cyrus* females, but there are funnier things still in connection with *polytes*—that the *hector*-like form should only extend, or nearly so, as far as the real *hector* extends, for example.

"I am always breeding moths and butterflies, but have

little time for any experiments, as they take time, and one must have leisure as well as be able to stay in one place for a certain length of time. Anyway, I'll try and send you what you want."

The male and female of Acraea chilo observed in coitu.—Prof. Poulton said that he had received a letter dated Oct. 6, 1914, from Rev. K. St. Aubyn Rogers at Sagalla, near Voi, British East Africa. In this letter he had been much pleased to read the following interesting and long-looked-for observation :—

"On Sept. 11 I observed a pair of *Acraea chilo*, Godm., *in copula*, the female being of the form long known as *A. crystallina*, Gr.-Sm. Unfortunately they flew into a large thorn tree, where they were quite inaccessible; but, as it was entirely leafless, I was able to make quite sure of the identity of the insects. I could see them only a few feet away through the branches, although I could not dislodge them. The female was the active member in the marriage flight, the male hanging inert behind her. I think you will be glad to have this confirmation of Neave's discovery (Ent. Mo. Mag., 1909, p. 171)."

Males of Ceratopogon myrmecophilus and Formicoxenus nitidulus on the hillock of Formica rufa near Bournemouth.—Prof. Poulton exhibited the specimens and read the following note contributed by Mr. A. H. Hamm, of the Hope Department :—

"The small flies exhibited, which Mr. Donisthorpe has identified as *Ceratopogon myrmecophilus*, Egger, were first taken by him in England a few years ago. I found them in abundance flying and settling on a single nest of the large wood-ant, *Formica rufa*, L., near Bournemouth, on Aug. 6 last. I had no doubt, from the moment I saw them, that they were truly myrmecophilous, because of the fearlessness with which they moved about among the ants on the surface of the hillock. The ants did not attempt to molest them in any way, merely touching them with their antennae and passing on. Other small flies which, by way of experiment, I threw among the ants were immediately seized and carried off. I also enclosed one of the *Ceratopogon* with six of the ants in a glass-bottomed

pill-box, and even in such close quarters the fly remained for a day and a half quite uninjured.

"While watching these flies I noticed, on the surface of the same nest, a small ant running about, which I recognised as *Formicoxenus nitidulus*, Nyl., a species invariably found in the nest of *F. rufa*. I continued to watch the nest and took altogether thirty-four individuals, all of which I suspected at the time would prove to be males, a view subsequently confirmed by examination of the mounted specimens with a strong lens. No worker of this ant was seen during the hour and a half spent in watching the nest. This, I think, is very significant, and leads one to believe that the apterous males were in all probability seeking for the winged females, or that their presence on the surface may possibly attract the females. Under any circumstances, I feel convinced that their presence on the nest was related to subsequent courtship and pairing."

Mr. Donisthorpe said he had found the male of *Ceratopogon myrmecophilus*, Egger, in many localities hovering over nests of *Formica rufa*, but the female seemed to be very rare. He had taken one in a *rufa* nest at Oxshott, bred a second in his *rufa* observation-nest, and a third he found in a nest of *F. exsecta* which he had brought up from Parkhurst Forest, Isle of Wight. *Formicoxenus nitidulus* was, he said, only found in nests of *Formica rufa* and *F. pratensis*; he had once found the male in some numbers in, and on, a nest of *F. rufa* at Weybridge; the day was dull and cloudy, just such a day as described by Wheeler when he observed the copulation of this ant in Switzerland, and as soon as the sun came out the ants all disappeared into the nest. Mr. Donisthorpe said that no winged females were found with the males at Weybridge, and he had only once taken the winged female, at Bournemouth, some years ago. How this species founded new colonies was not known, but he had suggested that after copulation the female flew away to another *rufa* nest, though some would re-enter their own *rufa* nest, which would account for the fact that a number of deälated females were usually present in the same nest.

Mr. Crawley remarked that though no marriage flight was possible in the case of species with apterous ♂♂, yet an

analogous activity occurred, the ♂♂ running about in an excited manner on the surface of the nest.

New Species of Rhopalocera.—Mr. G. Talbot, on behalf of Mr. J. J. Joicey exhibited the following :—

(1) Specimens to illustrate a paper, by Messrs. Joicey and Rosenberg, on new species of *Catasticta*, viz. :—*Catasticta noakesi, C. fulva, C. grisea, C. huancabambensis, C. talboti, C. rosea*, and *Daptoneura nigrocosta*.

(2) New species of Lepidoptera in the collection of Mr. Joicey, viz. :—*Ornithoptera joiceyi*, ♂ and ♀, *Delias nigropunctata*, *Delias fuliginosus*, ♀ ab. *ochraceus*, and *Charagia hampsoni*, ♂ and ♀.

Papers.

The following papers were read :—

" Notes on the Life-History of *Plebeius zephyrus*, var. *lycidas*," by T. A. Chapman, M.D., F.Z.S., F.E.S.

" Note on the Manubrium of the ninth sternite in the male Earwig," by Malcolm Burr, M.A., D.Sc., F.E.S., etc.

" The Opisthomeres and the Gonapophyses in the Dermaptera," by the same.

" On the Male Genital Armature of the Dermaptera "—Parts I–III, by the same.

Wednesday, November 18th, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the Chair.

Election of Fellows.

Messrs. Harry George Champion, B.A., c/o U.S. Dept. of Agriculture, Entomological Bureau, Washington, U.S.A.; J. J. Lister, St. John's College, Cambridge, and Merton House, Grantchester; and Rev. James Waterston, B.D., B.Sc., 22 Blandford Road, Bedford Park, W., were elected Fellows of the Society.

Honour for Ex-President.

The PRESIDENT announced that the Royal Society had awarded the Darwin Medal to Prof. E. B. POULTON, a former President of the Entomological Society.

Nomination of Officers and Council.

Before announcing the nominations for the next year's Officers and Council, the Secretary said that the present Council desired to put on record their great regret that Dr. Chapman had again declined to be nominated for the Presidency. The Council felt that his continued absence from the Presidential chair would be a lasting stigma on the Society, unless it were somehow put on record that it was by his own desire that he did not occupy it.

The Nominations of the Council were as follows :—

President, the Hon. N. CHARLES ROTHSCHILD, M.A., F.L.S., F.Z.S.; *Treasurer*, A. H. JONES; *Secretaries*, Comm. J. J. WALKER, M.A., R.N., F.L.S.; the Rev. GEORGE WHEELER, M.A., F.Z.S.; *Librarian*, G. C. CHAMPION, A.L.S., F.Z.S.; *Other Members of Council*, G. T. BETHUNE-BAKER, F.L.S., F.Z.S.; E. A. BUTLER, B.A., B.Sc.; E. A. COCKAYNE, M.D.; J. E. COLLIN, F.Z.S.; H. ELTRINGHAM, M.A., D.Sc., F.Z.S.; C. J. GAHAN, M.A.; E. ERNEST GREEN; G. B. LONGSTAFF, M.A., M.D.; G. MEADE-WALDO, M.A.; G. W. NICHOLSON, M.A., M.D.; H. ROWLAND-BROWN, M.A.; A. E. TONGE.

Exhibitions.

ANTHROCERA MELILOTI (?) AND PARASCOTIA FULIGINARIA FROM CAMBERLEY.—Mr. E. E. GREEN exhibited 2 specimens of an *Anthrocera* (*Zygaena*) from Camberley taken Aug. 20, 1914, which appeared to be *A. meliloti*, though South states that "the only part of Britain that the species inhabits is the New Forest, Hampshire." He also exhibited a specimen of the rare Hypenid *Parascotia fuliginaria* taken at light at Camberley, July 21, 1914.

The PRESIDENT said that he should have named the specimens *meliloti* without hesitation, and Mr. JONES concurred.

Mr. ROWLAND-BROWN hoped that Mr. Green would not divulge the exact locality.

A remarkable Coliad.—Mr. E. B. Ashby exhibited on behalf of Mr. Dickinson a few butterflies from Hinterzarten in the Black Forest and from Pontresina. Amongst them was a ♀ *Colias palaeno*, var. *europomene*, of the large form of the lower levels, and another which was regarded by the exhibitor as an aberration.

The Rev. G. Wheeler expressed the opinion that the latter was a hybrid between *C. palaeno* and *C. hyale*. It was afterwards pointed out by Mr. H. J. Turner that the antennae were different, one resembling those of *C. palaeno* the other those of *C. hyale*.

Parasite imprisoned in the Cocoon of its Host.—Mr. Prideaux brought for exhibition the cocoon described in the following note, with its contents :—

In 1913, a larva of *Bombyx quercus*, apparently healthy, spun its cocoon, but no emergence took place that summer or next. On cutting open the cocoon, the dead, shrivelled larva was found inside, together with the empty puparium of a dipterous parasite, which, with the wings unexpanded, lay beside it, imprisoned within the cocoon of its host. He inquired whether the case was an unusual one, since in his experience the parasites as a rule leave the body of this larva before the very tough cocoon is spun.

Butterflies from Central Spain.—Mr. Simes exhibited a series of *Agriades thersites*, *Plebeius zephyrus*, var. *hesperica*, and *Melitaea desfontainii* from Albarracin taken in the end of May and the beginning of June this year. The ♀♀ of *A. thersites* were strongly marked with blue, and amongst the ♂♂ was a specimen the underside of which had only the discoidal and marginal spots.

Papers.

The following papers were read :—

"A Revision of the Mexican and Central American *Telephorinae* (Fam. *Telephoridae*) with Descriptions of New Species," by George Charles Champion, A.L.S., F.Z.S., F.E.S.

"Descriptions of two New Genera and New Species of *Mymaridae* from Tasmania," by Chas. O. Waterhouse, I.S.O., F.E.S.

Wednesday, December 2nd, 1914.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the Chair.

Election of Honorary Fellow.

Prof. Lameere of Brussels was elected to the Honorary Fellowship vacant by the resignation (and subsequent death) of Dr. August Weismann.

Prof. Poulton read a letter showing the circumstances under which Dr. Weismann had been persuaded to sign the declaration of the German Professors.

Appointment of Auditors.

The President announced that he had nominated the following Fellows to act as Auditors :—

On the Council : Messrs. S. Edwards, G. Meade-Waldo, and H. Rowland-Brown.

Not on the Council : Messrs. R. W. Lloyd, H. J. Turner, and C. O. Waterhouse.

Exhibitions.

Coloration of Desert Hymenoptera.—The Rev. F. D. Morice exhibited a few Hymenoptera of various groups from Egypt, Algeria, etc., showing the silvery pubescence and pale colours frequently characteristic of Desert insects. Also a lantern slide showing the seventh ventral segment in *Prosopis communis* ♂.

Dark Aberration of Argynnis niobe.—Mr. H. J. Turner exhibited a striking aberration of an *Argynnis* with symmetrically coalescent dark markings on the upper side and the silver spots on the under side hind-wing forming a triple basal blotch and marginal streaks; it was taken this year on August 2, in the deserted garden of Prince Henry of Prussia at St. Moritz in the Engadine. The species being uncertain Mr. Turner showed with it specimens of the three Swiss species of *Argynnis*.

The Rev. G. Wheeler observed that in the case of a ♂

the species were readily distinguishable by the position of the androconia on the nervures, and by this test the insect was shown to be *A. niobe*.

Prey of an African Asilid.—Mr. S. A. Neave exhibited a large series of insects, 1326 in all, forming the prey of a common Asilid, *Promachus fasciatus*, including Lepidoptera 91, Coleoptera 279, Hymenoptera 334, Orthoptera 55, Rhynchota and Homoptera 132, Neuroptera 4, and Diptera 361, of which no less than 101 were other, or in a few cases, the same, species of Asilid. He also exhibited an example of a Mantis, *Polyspilota pustulata*, Stål, preying upon the large Asilid, *Hyperechia consimilis*, Wood.

Mr. Neave received the thanks of the Society for this interesting and laboriously collected exhibit.

A scarce British Neuropteron.—Mr. W. J. Lucas exhibited a specimen of *Drepanepteryx phalaenoides*, Linn. (Order Neuroptera), taken about the end of July 1914, by Mr. E. A. C. Stowell, B.A., at Bexhill. It was found sitting very quietly on the glass of a street lamp between 10 and 11.30 p.m., on the outskirts of Bexhill about three-quarters of a mile from the sea. It so closely resembles the Hook-tip *Drepana falcataria* that its captor took it for that species. For a Neuropteron it is fairly large; but still this was only about the twentieth specimen that had been captured in Britain. Apparently it seldom flies in the daytime, and may on that account escape notice. Judging by the date of capture of various specimens its period of flight is a long one.

A movable microscopic stage.—Dr. H. Eltringham exhibited a little machine of his own invention consisting of a mechanical stage specially adapted for the microscopical examination of pinned insects, and so contrived as to admit of the insect on its pin being turned completely round on both a vertical and horizontal axis, without its departing from centre of the field or the focal plane.

An Australian Lycaenid larva resembling the flower of the "Wattle," on which it feeds.—Prof. Poulton exhibited the flowers of an *Acacia*, probably *A. baileyana*, F. v. Muell., together with a female Lycaenid, *Nacaduba biocellata*, Feld., and the pupa-case from which it had emerged.

On August 3 last Prof. Poulton was collecting Thrips with Mr. H. M. Giles, at Mundaring Weir, in the Darling Range, near Perth, W.A. While shaking the flowers of a Wattle over a sheet of cardboard, there fell a Lycaenid larva which bore the most remarkable resemblance to the yellow fluffy balls of the inflorescence. The likeness, mainly due to the long yellow hairs with which the larva was clothed, was increased by its attitude, the body being rather strongly curved. Mr. G. A. Waterhouse, to whom he had described the caterpillar, had told him that no such Lycaenid larva was known in Australia. The *Acacia* was a small tree, one of a series evidently artificially planted by the roadside. The name, given by Mr. Giles, had been confirmed by Dr. Otto Stapf, F.R.S., so far as it was possible to determine the species from the dried flowers alone. *A. baileyana* was only known wild in a limited area of New South Wales, but the Mundaring plant was not wild. The larva pupated without any supply of food beyond the quickly drying blossoms enclosed with it, and the imago emerged August 30, on the P. and O. steamer 'Malwa,' off Albany, W.A.

Dr. G. D. H. Carpenter's observations on Dorylus nigricans, Illig., in Damba and Bugalla Islands.—Prof. Poulton read the following record of observations from the same letter as that quoted in the succeeding note on *A. egialea*. Dr. Carpenter's further conclusions as to the habits of the Driver ants of these islands in the N.W. of the Victoria Nyanza had been published in Proc. Ent. Soc., Lond., 1913, cxxviii.

"I have got some notes for you on *Dorylus*, which I think may be of interest to the Entomological Society. I send them because I have recently been interested in reading Lamborn's and Farquharson's notes [Proc. Ent. Soc., Lond., 1913, cxxiii–cxxviii; 1914, v–viii]. Of course I constantly meet them out hunting, and sometimes get them all over me! As a general rule, in the forest, one can *hear* them before seeing them. They run up branches and tall stems, and then when they get to the top either fall or drop off on to the leaves below, and the pattering noise thus made (like that of tiny raindrops) is very distinctive, and often gives one warning. They cer-

tainly *do* eat vertebrates. I once heard pitiful squeaks in long grass and found they were attacking a baby rodent : needless to say I freed the infant ! One night on Bugalla an enormous army raided my house—luckily they did not attack me in my tent, although one small column came through it—and devoured a nestful of young swallows. Bones and all were carried away, and when I got up in the morning I found the nest full of a writhing mass of these brutes ! I know no more horrid sight in nature than a huge caterpillar rolling over and over in agony while it is cut up alive. The Drivers will even manage to cut up slugs, in spite of the slime poured out which usually overwhelms some of them. However, a new species of snail like a huge *Vitrina*, which was not uncommon on Damba, used to escape. It shrank as far as possible within the shell, and produced a mass of bubbles of mucus which so completely surrounded it, shell and all, by a barrier about half an inch thick, that the ants could not get at any part of its body. It was curious to see them biting into the foam and of course finding nothing : and the bubbles were so tenacious that they could not be burst. When an army of *Dorylus* had been through the jungle hunting, one used to see numbers of these snails which had tried to escape by crawling up tall stems, and then, having come to the top, had surrounded themselves by foam. Indeed, these were the only occasions on which I ever found this mollusc, which probably lives low down among decaying leaves, etc.

" I very often used to see *Dorylus* hunting on Damba fly beach, while I was doing observational fly work there. Between the edge of the forest and the water was a pebbly beach about ten yards wide, and when the ants were hunting, this was thronged with lurking denizens of the dark damp places among dead leaves, etc., which had to flee for their lives from the forest. Cockroaches ran madly about in all directions—if only they kept their heads they might have escaped—but they ran about so wildly that they often tumbled head over heels and thus fell all the easier victims ! I twice saw, hovering over these cockroaches, and occasionally suddenly pouncing down (apparently for the purpose of ovipositing) several of a small long-bodied insect—it might have been a Dipteron or

an Ichneumon, but the hovering and darting flight suggested rather a Syrphid. It was so extraordinarily active that I failed to catch it. At the time I was puzzled by this, for I couldn't see the object of laying an egg in an insect which was destined to be cut up into little bits at once ! I was therefore extraordinarily pleased, when recently re-reading Bates on the Amazons, to note that he describes a precisely analogous thing in the case of a fly of genus *Stylogaster* (*Conopidae*) and the foraging ants *Eciton*. He says 'the armies of all Ecitons are accompanied by small swarms of a kind of two-winged fly . . . these swarms hover with rapidly vibrating wings at a height of a foot or less from the soil over which the Ecitons are moving, and occasionally one of the flies darts with great quickness towards the ground. I found they were not occupied in transfixing ants, although they have a long needle-shaped proboscis, which suggests that conclusion, but most probably in depositing their eggs in the soft bodies of insects which the ants were driving away from their hiding-places. These eggs would hatch after the ants had placed their booty in their hive as food for their young.'

" Isn't it extraordinarily interesting that two such different species of ants, but of precisely similar habits, should be attacked by parasites in the same way in South America and Uganda ? If one thinks of it there is very little chance for an enemy to attack these ants, which are so active and ferocious and of wandering habits. So either this method, or the method of stealing the pupae which Lamborn described recently, had been evolved as a means of checking such a formidable species. But what extraordinarily fine adjustment to the habits of the ant ! The method of gaining an entrance into the inaccessible nest reminds one rather of old stories such as the wooden horse of Troy, etc. !

" I once saw a Hemipterous insect escape being eaten by *Dorylus*. It was one of the flat, triangular, vegetable-feeding type. The ants were all over the bush and frequently seized an antenna or a leg of the bug, but always let go again. This is interesting, because they will eat such distasteful things as Acraeine larvae and pupae.

" In almost the first column of *Dorylus* which I saw on the

march (not hunting but hurrying along a narrow pathway) I found amongst the ants a Coprid beetle [probably an aberrant *Onthophagus*, or belonging to an allied genus], which I was informed by the Entomological Research Committee was quite unlike anything they had in the British Museum. It was—so far as I remember—about half an inch long, black, highly polished and flattened, with limbs closely fitting. It ran along in the midst of the column, with ants all round it and often hurrying over it. Sometimes it came near the edge of the column (which was about six ants wide), and had it been an involuntary inclusion in the army could easily have escaped. but always went back again amongst the ants. It must certainly have been myrmecophilous—a bold insect indeed to attach itself to such ferocious friends! This column was a particularly large one. When I noticed it first, on the evening of July 18, 1910, it was crossing a pathway, and the ants ran between walls formed of others standing as it were on tiptoe with jaws widely agape. These walls are literally made of a meshwork of ants with entangled legs—and sometimes they roof over the line of march in the same way.

"At sunset, then, on July 18, the column of ants was pouring across the road, coming out of a hole on one side and going down a hole the other side. My notes, made at the time. said—'I think every ant had a pupa, but not one carried a larva.' It was in this column that I saw the beetle before mentioned. On the morning of July 19, the column was still streaming across in the same direction, and flowed continuously until 3 p.m., when the living walls had broken up. and the column was formed of a few ants only without pupae: by sunset they had all crossed over. But for at least twenty-four hours (for I have no doubt whatever they had been marching all night) they had been passing in a continuous stream! This must have been the occasion of a change from one temporary camp to another.

"The ♂ *Dorylus* is a most objectionable fellow. In the first place he uses the end of his long and heavy abdomen as an extra leg with which to push himself along (after the manner of a Carabid larva). In the second place he is attracted by light and comes buzzing and banging round, and

crawling everywhere in the objectionable manner I have mentioned, until one is forced to bottle him—one cannot get rid of him otherwise. As many times as he is hurled away with frightful curses back he comes—until one is sick of him ! Before rain is the time,—and I have had as many as twenty come one after another ! "

Dr. G. D. H. Carpenter's observation of the epigamic use of its anal brushes by the male Amauris psyttalea, Plötz.—Prof. Poulton read the following note extracted from a letter written to him, July 23, 1914, from Kome Island in the N.W. of the Victoria Nyanza, by Dr. G. D. H. Carpenter :—

" On July 21 at the edge of the forest here on Kome Island, about 3 p.m., I saw the *courtship of Amauris psyttalea*, Plötz. I noticed two flying about, obviously a male pursuing a female. Presently the latter settled on an erect dead flower-spike of an aromatic labiate, about two feet above the ground. She sat with head upwards, and body perpendicular, wings outspread at right angles. The ♂ hovered flutteringly about four inches over her head, rising and falling a little, but on the whole at about the same level. His abdomen hung down a little and every now and then, at intervals of a few seconds, the two flaps [the ♂ claspers, especially large in Danaines] at the end of the body were widely separated (so as to stand out at right angles to the longitudinal axis of the body) and the brush was quickly protruded and as quickly drawn in again. I was surprised to see what a large structure it was—being quite white and visible at a distance of several yards. In fact, I first noticed it at that distance, and went closer to see what was going on. The ♀ sat quite still, except for an occasional very slight movement of the wings. I watched for a minute or so, and it was impossible to doubt that the ♂ was endeavouring to excite the ♀. Just as I thought I would catch them as records, the ♀ suddenly flew away and the ♂ followed. I have, however, no doubt of the species.

" The very sudden protrusion of the brush might easily cause the peculiar fine hairs of stellate section, described by Eltringham, to break into sections which would float like dust in the air."

Prof. POULTON said it would be remembered that Mr. W. A. Lamborn had observed the stroking of the hind-wing brands by the anal brushes of the male *Amauris niavius*, L. (Proc. Ent. Soc., Lond., 1911, xlvi, xlvii), and *A. egialea*, Cram. (1912, xxxiv, xxxv; 1913, lxxxiii, lxxxiv). Dr. Carpenter had now carried these observations a stage further, by showing the manner in which the brushes, presumably charged with scent from the brands, were employed in courtship. The relative positions of the two insects suggested the possibility that the antennae of the female were the sense organs stimulated by the odoriferous powder. It was most satisfactory that these valuable observations in the field should throw so much light upon, and receive so much light from, Dr. Eltringham's admirable investigations in the laboratory.

Paper.

The following paper was read :—

"Further Observations on the Structure of the Scent-organs in certain Brush-bearing Male Butterflies," by H. ELTRINGHAM, M.A., D.Sc., F.E.S.

The paper was profusely illustrated with slides shown in the Epidiascope.

ANNUAL MEETING.

Wednesday, January 20th, 1915.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., President, in the Chair.

Mr. R. W. Lloyd, one of the Auditors, read the Auditors' Report, which was adopted on the motion of Mr. E. B. Ashby, seconded by Mr. Tonge.

The Rev. G. Wheeler, one of the Secretaries, then read the following

Report of the Council.

During the current year we have again had occasion to elect one Honorary Fellow in place of Dr. August Weismann, and the choice of the Council, endorsed by the Society, fell on a Belgian Entomologist, Professor A. Lameere of Brussels.

Our losses by death among the Ordinary Fellows have been unusually few, amounting to six only, viz. the Rev. E. N. Bloomfield, and Messrs. B. C. Chetty, H. T. Dobson, H. H. Lyman, E. Olivier, and Wm. Warren, one of whom, Mr. Lyman, went down with his wife in the *Empress of Ireland*. Our losses in other directions are, however, somewhat heavier than usual, nine Fellows having resigned, and ten being removed from the list. We have thus lost in all twenty-five ordinary Fellows, while thirty-four have been elected; our numbers, therefore, still showing an increase, since we have now six hundred and thirteen ordinary and twelve Honorary Fellows, reaching a total of six hundred and twenty-five.

Important as the year 1914 has been in other ways, there is unusually little to chronicle with regard to the Entomo-

logical Society. The Officers, Council and Fellows unanimously associated themselves with the forcible yet dignified Reply published in *The Times* of Nov. 4th to the Declaration by certain German Professors on the responsibility of Great Britain for the War, and the Society has, again by a unanimous vote, opened its library and its meetings during the War to Entomologists of allied nations who are members of a recognised Society, and temporarily resident in this country, on the same footing as ordinary Fellows, except for the right of voting.

The Darwin Medal has this year been awarded by the Royal Society to an ex-President of our own, Professor E. B. Poulton.

Our Transactions for this year form a Volume of some 540 pages, containing 20 papers by the following Authors :— The President, Messrs. G. C. Champion, A.L.S., F.Z.S., F.E.S., (2), T. A. Chapman, M.D., F.Z.S., F.E.S., (5), E. Dukinfield-Jones, F.Z.S., F.E.S., J. Hartley Durrant, F.E.S. (in conjunction with the Rev. F. D. Morice, F.E.S.), F. W. Edwards, B.A., F.E.S., Miss Margaret E. Fountaine, F.E.S., Messrs. E. Ernest Green, F.E.S., Geoffrey Meade-Waldo, M.A., F.E.S., Edward Meyrick, B.A., F.R.S., F.E.S., Rev. F. D. Morice, M.A., F.E.S. (in conjunction with Mr. J. Hartley Durrant, F.E.S.), Kenneth J. Morton, F.E.S., R. C. L. Perkins, M.A., D.Sc., F.E.S., Frank H. Taylor, F.E.S., and Chas. O. Waterhouse, I.S.O., F.E.S.

Of these, nine refer to the Lepidoptera, five to the Hymenoptera, two each to the Coleoptera and Diptera, and one each to the Homoptera and Odonata. While the papers are not so numerous nor the Transactions quite so voluminous as of late years, they are illustrated by no less than 92 plates, consisting of 8 chromo-lithographs, 1 three-colour plate, 1 black-and-white lithograph, 67 half-tone plates, and 14 line blocks. The entire cost of 2 chromos and 5 line blocks was contributed by Mr. F. D. Godman, and the entire cost of 8 half-tones, as well as the drawings and half the cost of reproduction of 4 chromos and 40 half-tones by Dr. Chapman; the drawings or photographs for 1 chromo were given by Mr. E. Dukinfield-Jones, for 11 half-tones by the President, for 2 half-tones by

Mr. F. H. Taylor, for 1 half-tone by Mr. Kenneth J. Morton, for 7 line blocks by Mr. F. W. Edwards, for 2 line blocks by Mr. E. Ernest Green and for 1 half-tone by Mr. C. O. Waterhouse.

The Proceedings, which occupy 112 pages, are also illustrated by two half-tone plates, the entire cost of one of which was borne by Dr. Chapman, as well as by several text-figures and a chart,* and contain, in addition to notices of the exhibits made at the meetings, an account of several important discoveries, largely contributed by Fellows at work in Africa, and a report of interesting discussions which have arisen at the meetings. Notwithstanding the fact that many of the younger Entomologists are with the colours, the attendance at these has been well kept up by the older Fellows, and has never fallen so low as 50, even since the outbreak of the War.

The Treasurer reports as follows :—

" The balance sheet compares favourably with that of last year. One satisfactory result is a record receipt for Annual Subscriptions, being £5 in excess of last year and £40 in excess of the average totals five years ago. The other receipts are less than the previous year, with the exception of the amount under the heading of ' Interest on Investments.' This sum steadily increases, and now amounts to nearly £40 per annum—comparing with £29 17*s.* 2*d.* in 1910.

" The cost for printing, £407 3*s.* 2*d.*, is a heavy item, but during the ensuing year I have every reason to anticipate this expense being materially reduced. The cost for plates, £169 4*s.* 3*d.*, may appear excessive, but from this item £58 14*s.* 9*d.* has to be deducted for the various amounts received from contributors, and is merged in the total of £65 18*s.* 6*d.* under the head of ' Donations.' The further depreciation of £41 18*s.* 11*d.* in the value of our securities, since the War, is not, I think, excessive.

" A. Hugh Jones,
" *Treasurer.*"

* The President's Address is illustrated by 12 half-tone plates, of which he gives the entire cost.

The Librarian issues the following report :—

" Twenty-two Volumes of the usual periodicals and publications of Societies and a large number of Separata have been added to the Library during the past year, a list of which will be included in Part V of the Transactions.

" Four hundred and forty-nine volumes have been issued for home use, and the Library has been largely used for purposes of reference."

The Report was adopted on the motion of Mr. W. J. Lucas, seconded by Mr. Hugh Main.

No other names having been received in addition to those proposed by the Council as Officers and Council for 1915, the following were declared by the President to be elected.

President, the Hon. N. Charles Rothschild, M.A., F.L.S., F.Z.S.; *Treasurer*, A. H. Jones; *Secretaries*, Comm. J. J. Walker, M.A., R.N., F.L.S.; the Rev. George Wheeler, M.A., F.Z.S.; *Librarian*, G. C. Champion, A.L.S., F.Z.S.; *Other Members of Council*, G. T. Bethune-Baker, F.L.S., F.Z.S., E. A. Butler, B.A., B.Sc., E. A. Cockayne, M.A., M.D., M.R.C.P., J. E. Collin, F.Z.S., H. Eltringham, M.A., D.Sc., F.Z.S., C. J. Gahan, M.A., E. Ernest Green, G. B. Longstaff, M.A., M.D., G. Meade-Waldo, M.A., G. W. Nicholson, M.A., M.D., H. Rowland-Brown, M.A., A. E. Tonge.

The President then delivered his Address, illustrated by the Epidiascope, after which Mr. Merrifield proposed a Vote of Thanks to him, remarking on the patience and research needed for such a paper, and, while asking that it might be printed as a portion of the Proceedings, expressed the hope that the illustrations might also be reproduced. Dr. Jordan seconded the motion, which was carried unanimously.

The President in replying said that he was offering twelve Plates to the Society in illustration of the Address.

Mr. H. J. Turner then proposed a Vote of Thanks to the Officers for their Services, which was seconded by the Rev. F. D. Morice. The Treasurer and both Secretaries replied, Mr. Wheeler taking occasion to beg all exhibitors

to lighten the work of his office by giving him full notes of all exhibits *at the time,* written *in ink,* on *one side* of the paper, in the form in which it was intended they should appear, and either with a title, or with space left for its insertion.

ENTOMOLOGICAL SOCIETY OF LONDON.

Balance Sheet for the Year 1914.

Receipts.

	£	s.	d.
Balance in hand, 1st Jan., 1914	134	5	10
Subscriptions for 1914 ...	495	12	0
Arrears	16	16	0
Admission Fees	18	18	0
Donations	65	18	6
Sales of Transactions ...	117	6	5
Interest on Investments—			
Consols ... £31 5 9			
Birmingham 3 per cents. 6 14 9			
	38	0	6
Life Compositions	47	5	0
Subscriptions in Advance	21	0	0
	£955	2	3

Payments.

	£	s.	d.
Printing Transactions, etc.	407	3	2
Plates, etc.	169	4	3
Rent and Office Expenses	171	3	8
Books and Binding	30	6	5
Investment in Consols as per contra	47	5	0
Subscriptions in Advance as per contra carried to 1915	21	0	0
	846	2	6
Balance in hand	108	19	9
	£955	2	3

Assets.

	£	s.	d.
Subscriptions in arrear considered good	35	0	0
Cost of £1,354 2*s.* 2*d.* Consols. Present value at the price of 68½ on 31st December, 1914, £927 11*s.* 3*d.*	1,233	3	0
Cost of £239 12*s.* 4*d.* Birmingham 3 per cents. Present value at the price of 79 on 31st December, 1914, £189 5*s.* 11*d.*	250	0	0
Balance in hand	108	19	9
	£1,627	2	9

Additional Assets:—
Contents of Library.

Liabilities.

Cost of printing Parts 3, 4 and 5.

Audited, compared with vouchers and found correct, Tuesday, 12th Jan., 1915—

Chas. O. Waterhouse.
R. W. Lloyd.
H. Rowland-Brown.
Geoffrey Meade-Waldo.
Stanley Edwards.
Hy. J. Turner.

Less total depreciation of £366 5*s.* 10*d.* in the value of Securities.

A. Hugh Jones, *Treasurer.*
5th January 1915.

THE PRESIDENT'S ADDRESS.

Gentlemen,

The year 1914 has pursued its way, so far as the Society is concerned, very evenly, our meetings have been full of interest, and our Transactions maintain, I hope, the standard that has made them valued all over the world. It will not be out of place here to remark that we have recently had to defer and also to refuse valuable papers for lack of the means to publish them—this has been to some extent by way of precaution on account of the present crisis, but certainly not entirely so, and the need of a fund that could be devoted to the publishing of expensive papers is being greatly felt. The present may not be a suitable time to press this need, but I cannot refrain from mentioning it.

I must not let my term of office pass away without expressing my warm thanks to both our well-tried secretaries, and to our other officers as well; our genial Senior Editorial Secretary, Commander Walker, is always the same, kind and suave, ever ready to help in time of need, and with an experience on faunistic questions of the utmost value; our energetic "Minute" Secretary, Mr. Wheeler, with his knowledge of literature and his large experience of Central European butterflies, is always "on the spot" and equally ready with his help, and I believe we have probably never had a Secretary who has given so much of his time to the Society, for I understand that he spends some time nearly every day in these rooms, examining our archives and seeing to our business—to both these two friends my warmest thanks are tendered, for they, with the Treasurer and the Librarian, have made the past two years, years to be remembered by me, years of

much real pleasure, years of work made easy by their thought and kindness.

The obituary is always a sad necessity—we have lost by death six Fellows, viz. Edwin Newson Bloomfield, B. C. Chetty, H. T. Dobson, Henry Herbert Lyman, Ernest Olivier and William Warren.

It is impossible to close this prologue to the main topic of my address without any reference to the greatest calamity that has fallen upon us, and I may say upon the whole civilised world. Whether this terrible war will be the last great war among the nations—who can tell? Perchance, when it is over and in cold blood the instigators of it, as well as all participators in it, review the frightful tragedy thereof, is it too much to hope that a higher ideal than "might is right" may yet be reached?—that is a doctrine that is not admitted for the individual, even by the nation who would force it on the world to-day. Surely, however, the nation should be higher than the individual in its aims, so that after this madness of greed is past, and all settle down and ponder, as ponder they must, then perchance the blunt old English adage "Live and let live" may yet be accepted even by our foes; and from that may all go on to recognise and build up, in the common cause of a world humanity, such a comity of nations as will prevent for all time the possibility of one country ever obtaining the mastery and control of all with whom it may come into contact; but for this it will be necessary for each race to act on the principle that honour and right dealing stand above a nation's individual claims, in any case where the two come into conflict.

I will now proceed with the subject of my address.

"The Development of Clasping Organs in Insects."

It will without doubt be understood that clasping organs refer to the more or less external armature at the telum.

It will perhaps be well first of all to point out the positions of the various organs in the Lepidoptera, with, as far as I can, their possible homologues in some other orders. We have in the Lepidoptera, the tergite represented by the tegumen with

its falces often articulated to it, this is the main dorsal part of the armature; in addition to this there is the cingula or girdle, which really encircles the whole abdomen and is represented in the sternite also; this is the hindermost portion of the genitalia, the saccus forming in reality a portion of it; the cingula is sometimes a mere ring of fine chitin, more often it is considerably developed, and is fused in the tergite with the back part of the tegumen; in some cases the cingula is articulated at the meeting-place of the tergite and sternite. The anus is emitted directly below the tegumen. In the sternite the largest organs are the harpagones or clasps, these being paired; the ringwall of Zander is a chitinous collar connected with the harpagones through which the ædœagus passes; the furca, whilst not really homologous with the ringwall, yet seems to take its place in most of the Rhopalocera and in some other cases. The ædœagus only needs mention to explain that it represents the whole organ, and that the penis, the vesica and the *ductus ejaculatorius* are parts of it.

In the Trichoptera the superior appendages are, I believe, homologues to a large extent of the tegumen and the inferior appendages of the harpagones. In the Diptera the same applies to a certain extent, but owing possibly to the position assumed by these organs in this order they are reversed by some authors. The Coleoptera have not, so far as I can trace, true homologues to the Lepidopterous external organs; neither, I believe, have the Hymenoptera, at least so far as the Aculeata go, though they are provided with intricate armature. The Odonata are quite distinct in all their characters.

It will probably be well to consider the more lowly orders first and to work upwards.

I have only been able to examine two species of the Thysanura, which group have no clasping organs, but merely sensory apophyses; this also is true with the Collembola, and, I believe, the Thysanoptera.

Petrobius maritimus, Leach,

has an enveloping outer case surrounding the ædœagus, which (case) is slit lengthwise along the dorsum and the

venter, the ædœagus is moderately long and straightish; on each side of it there is a gonapophysis with a large ample basal joint, at the end of which a long gradually tapering somite is articulated, whilst through both of these a long sensory duct is discernible terminating in a fine stylet emitted from the tapered end of the somite just referred to.

Petrobius brevistylis, Carpenter,

has the ædœagus very long, of moderate width for its basal half, when it gradually expands, and is roughly the shape of an Indian club; its enveloping case is simple, only covering half the length, but in addition there are a pair of rather longer somewhat narrowly elliptical sclerites, forming a vertical cover to the basal part of the ædœagus. The gonapophyses (one on each side) have the basal somite less ample than in *maritimus*, whilst the terminal somite is shorter but more robust and almost straight, with a bluntly rounded apex, from which is emitted the very short stylet that forms the end of the long sensory ducts running through these organs. I believe that this whole group of insects has the male organs developed on similar lines to these.

In the Orthoptera the genitalia have been used in recent years with much advantage for classificatory purposes. In the Dermaptera the word "parameres" has been adopted for parts of the armature that are *apparently* more or less homologous to some of the clasping organs in other orders. Zacher and Burr and Jordan have all dealt with the reproductive organs including these parts, and as Dr. Burr has ready a valuable work on the subject it is unnecessary to touch on it here. I may, however, present a single figure of another section of the order, viz. the cockroaches. *Blatta* and *Periplaneta* follow closely similar lines; both have thoroughly asymmetrical organs though they differ in certain minor characters.

Periplaneta americana

has a pair of large outer cerci in which the asymmetry referred to is very evident: the length of the one differs from that of the other, the articulations differ also, both in number

and in size; there are also a pair of smaller inner cerci that differ in length, but these are simple, not being articulated; there are two comparatively smallish lateral organs that are perhaps homologues of the harpagones of the Lepidoptera, the one assumes a somewhat "clasp"-like form and is deeply serrate, the other is twice the size with a longish pointed apex on one side and a sharply dentate short arm-like apophysis on the other side; whilst there are also two largish apophyses on one side, one of which is dentate for a portion of its length, somewhat ribbon-like in shape, whilst the other ends in a tubular-pointed and hooked apex; there is nothing on the other side corresponding with these organs unless we consider a smallish finely membranous cone-like process as a set-off to them. The ædœagus is quite small for the size of the insect.

The Odonata are, I believe, an order of insects standing entirely alone as to their copulatory systems, the anal orifice is situated at the end of the abdomen, viz. the twelfth abdominal somite, and here are placed in the male the principal clasping organs, but inasmuch as the ædœagus is not located at the end of the abdomen but is placed in the second and third somites and is furnished with secondary armature also, it is obvious that a highly specialised development must have taken place, whilst in addition to these points the orifice of the ejaculatory duct is on the ninth abdominal segment and therefore widely separated from the ædœagus. In the female the genital orifice occurs in the ninth abdominal segment, not in the twelfth. As a consequence of these facts, it follows that the copulatory position is entirely different in the Odonata from that obtaining in all other orders of insects. The primary clasping organs in the twelfth abdominal segment of the male seize the head or prothorax, or both, of the female; the superior appendages, *i. e.* those occupying the position of the tegumen n the Lepidoptera, clasp the back of the eyes or the prothorax, whilst the inferior appendages, *i. e.* those occupying the position of the harpagones in the Lepidoptera, clasp the space between the eyes on the face, thus acting as a pair of pincers over the caput; the abdomens of the two insects then face each other ventrally, the female clasping that of the male with her legs and bringing her ninth segment into contact

with the second segment of the male when mating takes place, the ovipositor or possibly the "bursa copulatrix" of the female being clasped by the secondary armature of the male that is connected with this area. The origin of this extraordinary development has yet to be discovered, the arrangement being nearer to that obtaining in certain of the Crustacea than to any other order, if perhaps we except the Araneina.

Bearing in mind these important characteristics, we will consider the primary clasping organs in a few families of the Zygoptera and the Anisoptera; in the former space only permits me to figure three genera in the *Calopterygidae* and one in the *Agrionidae*.*

Calopteryx maculata

has the superior appendages (? = tegumen in Lepidoptera) of a broadish triangular shape, the apex of the triangle being hooked and forming the apex of the appendage, this is the organ that will clasp the back of the head or the prothorax; the inferior appendages (? = the harpagones in Lepidoptera) consist of a ventral sclerite that is round, tapering slightly forwards (*i. e.* away from the head of the fly), and with a slight hook at the apex; in addition to which at the base is a cuneate hairy pad.

Hetaerina americana.

The superior appendages are long, bifurcate, narrower at the base, becoming heavily notched near the middle, from whence they are broader up to the rounded apices; the inferior appendages are short, paired, somewhat cone-shaped, but abruptly truncated at the apices instead of terminating in a point; the lateral hairy pads are also present.

Rhinocypha biseriata

has a single tapering superior appendage shortly spined with the apex expanded; the inferior are paired, somewhat

* I am greatly indebted to Dr. Walker of Toronto for allowing me to reproduce the figures showing the copulatory position in Odonata; the figure is taken from his well-known work on the North-American species of *Aeschna* ("Studies Univ. Toronto," 1912).

cuneate in shape, dentate and pilose; the hairy, lateral pads are but little in evidence.

Lestes rectangularis

has a pair of superior appendages that are long, broadish at the base, rapidly tapering half way, and then fairly uniform to the bluntly hooked apex; connected with these are a pair of hairy sclerites whose office I cannot understand, they are oval, pad-shaped with hairy edges. The inferior appendages, also paired, are not so long as the superior, and curved downwards; the basal parts are fairly broad, and they gradually taper to a rounded apex fringed with long hairs.

The same variety of organs obtains equally among the Anisoptera, in the *Gomphidae*.

Onychogomphus forcipatus

is well named, for its appendages are large and strong, the superior pair are bifurcate to the base and are markedly asymmetrical in their apices; they are long, strong and a third from the end are suddenly curved almost at right angles; the one apex is bluntly rounded, the other is longer and terminates in a fairly sharply pointed tip; the inferior pair, also bifurcate to the base, are more or less evenly curved, with a strong projecting tooth near the centre, the apex being the shape of a bird's head with a stoutish beak; the ventral lateral pads are small in comparison, but well developed. These organs must have a most powerful grasp, and the central tooth of the inferior pair seizing the face of the female should produce a deep impression.

Dromogomphus spinosus

has the superior pair of appendages wholly bifurcate, broadish and terminating in a longish triangular finely hairy apex; the inferior pair form a deep hood arising just below the dorsum, extending frontally on the venter into a rounded pad which assumes a pointed apex in one position; the hood is entirely cleft on the venter, the lateral pads are well developed and strongly haired.

Of the *Cordulegasteridae* and the *Aeschnidae* I can only show one genus each.

Cordulegaster annulatus

has the superior appendages large, entirely bifurcate, they are strongly notched on their interior margins; the inferior pair are of moderate width and length with notched apices, the lateral pads are roughly cuneate in shape with a fine membranous apophysis of a straight horn shape connected with each.

Epiaeschna heros

has the superior pair of great length and size bifurcate to the base, strongly angled at a third from that point, being notched bluntly before the angle, then gradually expanding into long spatulate apices which are fringed below with long hairs and are shortly spined on their dorsal areas for the whole length; the inferior pair are rather more than half the length of the superior, broadish, slightly tapering to blunt extremities, which are turned down and fringed with hairs; the lateral pads are somewhat cuneate, with the apex produced into a blunt tip, a strongly haired lobe being attached to the inner side of each.

Of the *Libellulidae* I can but show two genera.

Libellula quadrimaculata

has the superior appendages deeply bifurcate, hollowed internally, broadish and gradually tapering to bluntish apices; the inferior appendages are decidedly shorter than the superior, with the upper margin straightish and the lower well curved; whilst the apex or apices, as the case may be, are more or less pointed, they may in other species be somewhat rounded or squarish. This type of formation obtains in other Libelluline genera that I have examined also.

Sympetrum sanguineum

has the superior appendages bifurcate to the base, with somewhat razor-shaped blades; the inferior is bifurcate basally to a quarter from the apex, when it becomes one solid organ terminating in a blunt point; the lateral pads are small.

The Trichoptera bear a close resemblance in many characters to the Lepidoptera. One organ, however, is very different

superficially, the ædœagus; it almost always emanates from a short sac, often not half its length, and it bears with it paired apophyses, which are not infrequently elaborated into complicated and beautiful structures, sometimes comb-like or brush-like, or again they may be merely long-pointed stylets. In very many genera the ninth abdominal segment is perfectly obvious, and it is interesting to observe that the development of the first tergite is very considerable; I have not yet discovered any appreciable development of the first sternite in any orders that have yet come under my notice. The genitalia, generally speaking, vary very considerably in the different genera, though the genera appear to run true to their own form of structure; for instance, in *Rhyacophila* the harpagones or (in McLachlan's terms) the inferior appendages are large, as also in *Philopotamus*, whilst the tegumen or superior appendage is small; whereas in *Limnophilus* the tegumen is large and the harpagones are insignificant. In some genera the structure is very complicated, in others equally simple. I have found it a difficult task to make a selection of genera whereby comparison could be made with those of the Lepidoptera, but the few I give are quite fairly representative, and will, I hope, demonstrate some general idea of the similarity obtaining in the two orders.

Rhyacophila dorsalis, Curtis.

The ninth abdominal segment forms the large and prominent organ quite homologous to the cingula in Lepidoptera; it is a perfect collar, narrow on the venter, but widening out very rapidly laterally, and ascending thus to the dorsum or tegumen, where it projects forwards in a sort of saddle-shaped process entirely protecting the dorsal portion of the tergite armature of the anus; this armature, forming in Lepidoptera a portion of the tegumen, consists of a bifid, horn-like uncal extremity, connected by narrow short laterals with a process (somewhat analogous to what I take to be the gnathos of Pierce) consisting of asciate-shaped horizontal sclerites, the handle part being the fore extremity; below these lie the very large harpagones, which are each composed of two broad, slightly curved plates of chitin, articulated together, the

apical one not half the size of the rearward one, and terminating in a setose bluntly pointed lower apex and a somewhat excised and dentate upper apex; in the rear these are joined so as to form a short, broad tube, with a hole through which runs the long narrow ædœagus with its pair of long, very narrow, tapering apophyses.

This species is an excellent example whereby we can trace the line of development that might take place from these lower and more complicated structures to the simple forms that we see in the Rhopalocera, especially in some of the *Nymphalidae* and *Ruralidae*. In the tergite the gradual loss of the dorsal protection to the uncal arrangement, and its replacement by the anal armature in a more robust form, needs absolutely no imagination, and the gradual fusion of its laterals and of the gnathos into a reduced cingula is equally obvious, whilst the reduction of the harpago by its end segment is likewise obvious and very advantageous.

Limnophilus flavicornis, F.

In contrast with the preceding genus *Limnophilus* has very large dorsal armature and insignificant harpagones, whilst the cingula maintains its segmental distinctness in a yet more primitive manner, for we have the separation of the sternite and tergite quite apparent. The sternite cingula is very broad indeed and expanding forwards, whilst that in the tergite is reduced to a very small hooded structure lying between the subdorsal armature; the tegumen proper is absent, its place being taken by broad lateral plates each of which forms an ample hood with a serrate fore apex, within which, articulated to its rear, lie two straight tapering horns ending in a blunt point. The harpagones are exceedingly small, placed in an upright position parallel with the cingula, with the apex bent round to the front, terminating in an irregular cuneiform apex; the ædœagus with its usual short basal sac is of moderate length, upturned into a sharp rostrate apex, and having two long straight formidable spines. The two apophyses are even longer, and terminate in an elaborate, hollowed comb-like apparatus, that is well haired below the long terminal pectinations.

In *Anabolia nervosa*, Curtis,

the cingula retains its primitive character in that it shows the line of union of sternite and tergite, but it is specially interesting in that its sternite portion is fused into the harpago, forming practically one organ, which is very large, subtriangular in shape with a short digitate process at its front apex; the tergite portion of the cingula is merely a short narrow collar. The dorsal organs (the tegumen *in sensu stricto* being absent) consist of two ample lateral plates, subquadrangular, but narrower in the front and somewhat turned over inwardly on the dorsal line, within which lies on each side a large, heavy, cone-like process, which is very slightly curved; the ædœagus is of moderate length, narrowish, tapering to the apex, with the outer covering reaching almost to the tip; the apophyses are long narrow arms suddenly expanding at the end into a horn-like apex, as of a fallow-deer.

Stenophylax stellatus, Curtis,

has the cingula and the harpago also fused into one large organ that is almost cordate in shape, but with the outer edges of the broad part extending upwards, the front one into a longish arm with a subspatulate apex, articulated to the interior being a very long, sharp, straightish, tusk-like process; the subdorsal organs are two lateral hoods with a crenulate hollowed terminal process; the ædœagus is longish, lying in a long, very broad tube, the paired apophyses being merely very narrow, long, waved tubes tapering to a fine point.

Leptocerus aterrimus, Steph.,

shows the cingula as a broadish collar fused into the tegumen, the latter developing lateral cheeks that are excised dorsally; well below these are the gnathoi, consisting of two arms articulated below the cheeks, that are sharply angled upwards at their second joint, whilst at the third they are suddenly reduced, and terminate in a finely tapered hooked point; the harpagones are of moderate size, broadish near the base, tapering smaller to the front in a curved lower margin, with a deeply bifurcate apical jaw; the ædœagus is

short with a bulbous apex, the paired apophyses lying over the upper margin, being bent at the base and terminating in suddenly reduced fine apical points.

Brachycentrus subnubilus, Curtis.

The genitalia are very simple, the cingula is irregular, excurved to the rear, with the dorsum as a broad collar, attached thereto being the lateral cheeks usually considered part of the tegumen; the harpagones are rather small, with a sudden upward curve at the base, after which they project horizontally and terminate abruptly, but with a curious small hook on the outer side, below on the lower margin lies a narrow curved spikelet; the ædœagus is a short broad tube with the paired apophyses much reduced and lying at the rear as two smallish tapering pointed sclerites.

Glyphotaelius pellucidus, Retz.,

has the cingula simple, open at the rear in the sternite, but solid for the greater part of the tergite; the harpagones lie almost vertically along the outer edge of the cingula and taper slightly wider to their upper apex, which is somewhat squarish; the tegumen is a short pointed hood with two small lateral plates attached to its rear, with an upward projection at their apices, and on the interior lie two short digitate processes; the ædœagus is a long tube with an ovate apex, the paired apophyses being very beautiful, they are longish, fairly broad arms expanding widely at the serrated front apex, which is also furnished with very long comb-like pectinations, whilst lying on the interior is a yet longer process somewhat pointed and fringed with longish spines.

Plectrocnemia conspersa, Curtis,

has a very remarkable structure, the cingula is confined to the sternite and encloses the reproductive organs with the gnathoi; above them appear the anal armature with peculiar apophyses acting doubtless as sensory organs. The harpagones are broad and hollowed, tapering to a blunt point at the front apex; arising from them at the rear are two processes, a short digitate one shortly spined and curved downwards, and a larger, deeply hooked or curved one somewhat

long and rostrate; the gnathoi are short, finely membranous, with an ovate termination. The ædœagus is a short, simple tube. The dorsal armature is composed of a bifid hood with cuneate laterals, above which, under the tegumen proper, are two pair of fine apophyses with shagreened tips.

Halesus auricollis, Pict.

This is probably a primitive genus, and I bring it forward here merely to show the segmentation of the abdomen; the first tergite is unusually well developed—though it is well developed in a large number of the Trichoptera—whilst the ninth segment is also very evident as the cingula of the genitalia; the harpagones, the tegumen, and other parts at the extreme termination of the abdomen representing the tenth segment.

Coleoptera.

It is of course quite impossible for any one but a Coleopterist to deal with the genitalia of this vast order, the anatomy of which is as yet very imperfectly known; in fact, I suppose I should be correct in saying that the fringe of it has only been touched at present. A few friends have, however, kindly supplied me with specimens of different genera in some of the families, but they are not sufficient to generalise on satisfactorily. They are, however, of great interest, and point to a very wide field of research that would be of the utmost value to the entomological world. The natural supposition is that clasping organs are most useful to the most active and nervous species, we find, however, the genus *Psalidura* (*Curculionidae*) with very large external organs; now this is a genus that cannot fly and that is very sedentary in its habits, the inference therefore would be that external organs are not needed, but the facts are that, needed or not, the external organs are developed enormously; this, however, is not the case with other genera in this family, and I am very doubtfu if they serve any clasping purpose. In the *Staphylinidae* and the *Clavicornia* (to mention only a couple of groups), we find no external organs at all, or only quite minute and insignificant developments.

It would appear that clasping organs are absent in very many if not the majority of the genera of Coleoptera; the reason of this is obvious; primarily the facts that the act of mating takes place with the male on the top of the female, that the weight of the insects proportionately is greater, together with the sedentary habits of the order as a whole, would seem to account for the lack of these organs—probably the dominant factor may be the sedentary habits of the insects, for we find the same position is adopted by the Diptera, and they have strongly and highly developed external armature; but here we have an excessively active and highly nervous order, the species of which are light, and very frequently they are very frail creatures to which a well-developed interlocking apparatus would be of the greatest value. Commander Walker, however, informs me that among the Coleoptera he has seen *Atomaria mesomelas* paired end to end, though whether this is the rule or not he does not know, nevertheless the fact is of great interest, for this species has no trace of any organs except the ædœagus, and the same is the case with other species of this genus. Many Coleoptera have prominent lateral sensory apophyses, and in a few genera I have found the terminal segment developing into a sort of weak lateral hook, but scarcely such as would form an efficient anchor. Sharp and Muir have shown (Trans. Ent. Soc. 1912, p. 477 *et seq.*) the excessive development of the ædœagus throughout the order, and it is very frequently an organ of great complexity and often of much beauty.

It is, however, a matter of considerable interest to realise that some Coleoptera have the front leg specially adapted for clasping purposes. *Dytiscus marginalis* has been observed by Mr. Darlaston to use it thus during the process of mating, the long terminal claws of the tarsus and the peculiar tri-lobed pad, the upper and largest lobe of which has two cushions that evidently act by suction, are admirably adapted to this use.

Ocypus fuscatus, Grav.

The figure shows the lateral apophyses well; these appear to be sensory organs.

Staphylinus erythropterus, L.,

shows the same lateral sclerites equally well, both of these are quite typical of their genera.

Achenium depressum, Grav.,

has the terminal segment excavated above and below, whilst the laterals are developed into the hooks already referred to; the hook is very definite, but it forms an uninterrupted part of the end segment and is not articulated. Above each hook is a small cone-shaped, shortly pilose sclerite, which would appear to be sensory in function. The same formation of lateral hooks, together with sensory sclerites, is found in the genus *Othius* and may be well seen in *fulvipennis*, Fab.

I have only time and space to refer to one genus in the *Clavicornia* :—

Silpha laevigata, Fab.

The ædœagus of this species would appear to be a beautiful object, if the vesica (as we term it in the Lepidoptera) were well ejaculated, but I would draw attention to the lateral sclerites, which in this genus do not appear to be sensory, but are more likely from their length and structure to be excitatory organs for use on the exterior of the female abdomen; the long, smooth rods do not seem at all likely to be sensory so far as the male is concerned.

Silpha quadripunctata, L.,

bears out entirely the suggestions of the previous species, the lateral sclerites are shorter but are more robust—other species of the same genus have the genitalia on entirely similar lines of structure.

Ichthyurus pachygaster

represents a genus with a pair of forcep-like sclerites, that almost remind one of the Dermaptera; the dorsal section is deeply bifurcate, curved on the upper margin and more or less cuneate, whilst the ventral section is quite small, also cuneate and bifurcate. The whole arrangement of these

organs precludes me from thinking that they are homologues of the clasping organs of other orders.

Taking into consideration the Lepidoptera I will begin by examining that most interesting and primitive order, the *Micropterygidae*, whose right to be included in the Lepidoptera has even been disputed. It is especially interesting, among other things, because in that group we find the whole of the ten segments of the abdomen quite in evidence; the ninth segment is most distinct, having, however, lost the division between tergite and sternite, and become in *Eriocrania* a broad solid collar, and in *Micropteryx* a shaped one; whilst the tenth segment is represented by the clasping organs themselves, though both form part of the genitalia as we now understand them. I find it difficult to say from these organs which of the two genera is the more primitive, but from the long penis with its rather complicated and apparently loose folding sheath, as also from the more intricate and probably less effective clasping organs, I should judge that *Eriocrania* was less advanced than *Micropteryx*.

In *Eriocrania purpurella*, Hw.,

the ninth segment is developed dorsally to appear as the tegumen, and is excavated dorsally so as to be bifid, but its power of vertical movement must be very limited—it is vertical action that is specially necessary in this part of these organs; the tenth segment is confined to the sternite area, as I believe, and is developed into the small if somewhat complex and weak harpagones, whilst the ædœagus is shown protruding from the opening with its enveloping sheath below it; this sheath is a loose, roll-up envelope, in this species quite copious, but in others very slight, and the ædœagus always rolls out with the least pressure whilst mounting the preparations.

Eriocrania subpurpurella, Hw.,

has the ninth segment much larger, the harpagones are more strongly developed with a small process above the harpago proper, whilst the ædœagus is very long and fine with an equally fine slight sheath.

E. fastuosella, Z.,

follows the arrangement of *subpurpurella* generally, but has decidedly more complex and useful clasping organs. Whilst in

E. semipurpurella, Steph.,

we find the genitalia poorly developed, weak and looking very ineffectual, but the ædœagus is very large with a very long sheath, the latter no doubt is a compensating development. Turning to the genus *Micropteryx* we find a marked advance. I can only refer to two species at the present time.

In *Micropteryx seppella*, F.,

the tegumen is again a part of the ninth segment, being extended along the dorsal line in the shape of a battledore; the harpagones are fully developed as clasping organs, and are attached to the lower part of the ninth sternite; they have a highly curved process attached to them, which is covered for half its length by a small curtain terminating in a horseshoe of small round tubercles, from each of which emanates a fine strong spine curved at the extreme apex; the ædœagus is quite small.

Micropteryx calthella, L.,

has the tegumen also a part of the ninth segment, but it is more strongly chitinised; the harpagones (tenth segment) are very similar to *seppella*, but the middle process above them is a large broad lobe with a double row of tubular sensory organs—I cannot call them hairs or spines for they appear to be abruptly truncated at their apices; the ædœagus is rather longer than in *seppella*. The anal orifice is shown as a short hairily terminated tube just above the mid process.

The *Hepialidae*, with an independent origin from the previous group, have retained very complex genitalia, evidencing in this respect but small advance. With the large size of many of this family and their restless habit, we are justified in assuming that the clasping apparatus would necessarily be large and strong, and I find this assumption is fairly correct. The

tegumen is large and very heavily developed laterally (a form of structure I believe to be very primitive, one that is rarely if ever found in the highest families of the Lepidoptera), with no more than a very narrow bridge on the dorsum; the union of the tergite and sternite organs being quite perceptible here. In the sternite section the harpagones are largish, there is a trough, along which rests the ædœagus, that is attached to the laterals of the tergite and is evidently capable of considerable movement; the cingula is composed of a broadish membrane with two strong curved arms in the front, the whole being confined to the sternite; the saccus is very imperfect, being almost a part of the cingula, with its development almost entirely frontal instead of rearwards; the ædœagus is quite small, generally more or less horn-shaped. Our common *humuli* is so typical of European and American, as well as of many exotic species, that I give a more detailed description of its organs.

Hepialus humuli, L.

The tegumen consists of two very broad lateral cheeks occupying the whole of the tergite, and bridged over by an excessively narrow saddle; the upper part of the lateral area is wedge-shaped, rapidly tapering to a blunt point, being deeply excised below and then developed into a broad adze-shaped frontal projection toothed on its fore edge, the adze shape necessarily involves a deep excision on its lower edge; the ædœagal trough is attached at the base of the excision, it is also attached to the rear of the lateral cheeks, and might at first sight be thought to belong to the tergite section, this, however, is not in reality the case, as I have no doubt from the analogy of other families that it really belongs to the sternite; the harpagones are moderately hairy and are peculiar, their shape would best be likened to the foot of a stocking cut off at the ankle and pressed flat, the ankle portion being affixed to the cingula well above the saccus, which might almost be described as bag-shaped. Even the genus *Phassodes* from Fiji follows closely this line of structure, though, as would be expected, the shapes of the different parts differ.

I have already figured in our Transactions the male armature of *Cossus cossus*, as also of *Duomitus leuconota*, but it may be well to consider another, and I will, therefore, take one widely removed geographically.

Langsdorfia frankii.

The structure of the tegumen in vertical sections is similar but it is decidedly smaller, and is without the pendant arms; the harpagones are not bridged over but are large, and at the rear of the upper margin they have a peculiar organ almost like a pair of callipers in shape, only the lower half is by no means so long as the upper; it consists of two horn-like extensions, the upper one curved, the lower one more or less straight, flexibly articulated at the base and attached to the margin of the harpago—the harpagones themselves are beautifully edged with long hair-like fringes; the ædœagal trough is prominent and the ædœagus somewhat similar to that of *Cossus*. The cingula differs from both *Cossus* and *Duomitus* in that it is developed into a complete collar. In addition to this there is a peculiar structure on the dorsum of the eighth tergite, consisting of a dorsal saddle with a deeply curved and strong hook, which apparently may hook into the tegumen.

From my description it will be seen that the genitalia o *Langsdorfia* form a distinct advance on those of *Cossus* or *Duomitus*, whilst at the same time they are essentially Cossid in character, the reduced tegumen, however, and the complete cingula show a decided upward development.

The *Zygaenidae* are another very primitive group, and judging from the male organs I am inclined to think that *Adscita* as represented by *statices* or *geryon* (which are thoroughly representative in structural detail) is more primitive than *Zygaena*, but *Heterusia*, whilst quite primitive in its tergite, is highly specialised in the sternite organs; this, however, is perhaps what might have been expected—*i. e.* some specialisation—from other aspects of the genus.

Adscita geryon, Hb.,

has the tegumen consisting of a very narrow dorsal bridge, from which is emitted a strong hook curved downwards;

the tergite part of the cingula is composed of two (one on each side) broadish, subovate, lateral plates; the sternite portion is merely a narrow collar articulated to a peculiar organ (there is one on each side), which is developed from its apex and is attached also to the tergite plates; this organ (or more or less pair of organs, it being very difficult to say they have no membranous connection) has a triangular base and is produced upwards in a long, finely hairy, finger; the harpagones are large, the hind margin being almost the ull width of the sternite and tapering but little to the apex, which is irregularly terminated; they are inclined upwards. The ædœagus lies in a simple trough, is large, slightly bulbous at the base and expanding somewhat at the orifice, where the vesica is haired; it terminates in a long spike; there is also a larger spike at the base. The structure of the tegumen, the articulated cingula, and the upward inclination of the clasps are, I believe, primitive characters.

In the genus *Zygaena* we have evidences of an advance n the development of these organs; the tegumen is larger and more specialised; the harpagones retain their upward position as in *Adscita*, but the ædœagus is large, with the outer sheath armed with a coat of mail of sharp teeth and often with a double ridge of formidable spines in addition—the median organ, so prominent in *Adscita* and an ancient character, has been lost in this genus.

Zygaena achilleae, Esp.,

is a very representative species; the tegumen is somewhat saddle-shaped, with the dorsal line deeply excised and forming two longish horns; the tergite section of the cingula is composed of two broadish, chitinous plates, bridged over on the dorsum and fused on to the tegumen, but tapering somewhat to meet the sternite part of the broadish irregular cingula; the harpagones are large and very broadly ovate, studded thickly with hairs (in some species with long hairs in parts and with a short brush-like arrangement in other parts); the ædœagus is longish, whilst the outer sheath may be long or short, in different species armed with strong teeth (in *purpuralis* it is but a short broad collar with a double row of very

formidable spines); in *achilleae* the sheath is long and has a similar double row of spines.

In *Heterusia* the development of the tegumen is very small and weak, but the whole of the sternite clasping and intermittent organs are extraordinarily specialised, and are so complicated that every part would require an explanation, so that I have thought it advisable to figure it only.

I have already in our Transactions referred to several Palaearctic genera of the *Psychidae*, but it would be well to confirm those observations, and I have therefore examined various exotic species and genera. Two will probably suffice for the present as they are confirmatory of others.

Clania variegata, Snell.

The organs are unusually long in this genus; the tegumen maintains its large hood-shaped cover, but it does not extend down laterally quite so extensively as in some genera; the harpagones are also largish, carrying strong teeth on the apices; the organ which I believe takes the place of the furca (a name I gave to a bifurcate process arising from the base of the harpagones some years ago, and which is almost universal as a guide and support to the ædœagus in the *Ruralidae*) encircles the rear of the clasps (or harpagones), lapping over them internally and extending in a long digitate process along their upper margin, bearing a certain number of fine teeth on ts upper edge. The ædœagus is long and irregular, with a swollen apex somewhat bifurcate.

Pseudoclania dinawaensis, B.-B.,

has the tegumen decidedly shorter, though the saccus with which it is connected by the cingula is equally as long; the harpagones are of moderate size, broad at the base and then suddenly tapering to the apex; over the ædœagus and harpagones is a peculiar pseudo-tegumen, which forms a hollowed curtain of chitin rather deeply bifurcate in a downwards curve; it lies immediately over the harpagones and well below the tegumen, and certainly has nothing to do with that organ, being a portion of the sternite; the ædœagus is very long, irregular in shape, with a trumpet-shaped orifice,

the apical third is of a rough external texture caused by a close covering of minute hairs.

It will thus be seen that the genitalia of these exotic genera are quite confirmatory in their characteristics of those of the Palaearctic region.

The *Aegeridae* must be briefly referred to, though I have already figured several specimens in these Transactions (1914, pp. 325–326, Pl. LXII, figs. 28–30), for I was then considering quite another point of view than that we are now dealing with. The family retains very primitive characters that are well seen in

Aegeria ichneumoniformis, S. V.

The cingula (and it is quite typical of the genus) has evidently not progressed at all, except perhaps in the long saccus and the slight proportions of the cingula itself; the sternite portion of it is erect from the venter and quite slight, then suddenly a sharp articulation on a short broadish arm occurs and the harpago is articulated to the end of this arm; the cingula then ascends again at the rear in a broader prolongation to the tegumen, which is ample but decidedly primitive, the beautiful brush is well developed, together with the recess into which it can be withdrawn and also its covering membrane; the elliptical harpago is densely furnished with the spatulate hairs; the ædœagal trough is emitted from the very base of the cingula and is long, forming a support also for the harpagones to rest on; the ædœagus is long and very narrow.

Trochilium crabroniformis, Lewin,

is more advanced in its cingula, which is not definitely articulated, but the sternite and tergite sections are evidenced in the recessed arms; the tegumen is an ample hood with a bifid uncal extremity, which is supplied with strong spines; the large harpagones with their frontal rows of powerful spines would appear to show but little progress; the ædœagus is short and broad.

It will be seen from these two genera that whilst this family is without doubt specialised in these organs, yet it is a specialisation that must be of very ancient date, and that apparently there has been but little development towards simplicity.

The *Drepanulidae* retain a primitive character in maintaining the tergite and sternite sections of the cingula, and in those genera where the cingula is more or less complete, *i. e.* advanced in type, the saccus retains its frontal development, a primitive character; another like character is the retention of the chitinous anus, which in all the higher families has become a fine membranous organ, in most cases so soluble as to disappear entirely in many mounts that are finely prepared. Most of these points appear in the two figures that I show.

Drepana harpagula, Esp.,

has the tegumen well advanced, the dorsum is hollowed and broadish, well excised so as to form two long fine lobes shortly haired, below are two long strong arms with a slightly bulbous termination, copiously if shortly haired; the lateral curtains are finely shagreened; the tergite part of the cingula is a fine broad hood fused into and within the tegumen and its laterals; the sternite section of the cingula, with the saccus in its higher form, *i. e.* receding development, forms a narrow curved process articulated to the tergite portion; the harpagones are composed of a pair of small elliptical basal appendages, and rising above them are two large ovate clasps covered with long strong hairs; the ædœagus is simple, a plain waved tube with a strongly shagreened vesica.

D. falcataria, L.,

has the tegumen of entirely the same type but very much more ample and larger; the cingula is very narrow in the sternite, but fused into the broad tergite hood; the saccus is produced well forwards, whilst the clasps are small, almost wedge-shaped, directed upwards and strongly spined at the upper apical angle; the ædœagus is shortish and broad with the vesica very strongly dentate; the anus has maintained its position in spite of the fact that the preparation from which the figure is taken underwent an exceptional amount of reducing and clearing.

The *Lithosiinae* and *Arctiinae* show in some of the genera decidedly complicated structures, thus showing their early derivation, but generally speaking they have advanced a good deal and have in many cases very simple organs. In

certain genera the tergite section has become a very simple organ, whilst the sternite retains great complexity. The genus *Euprepia* (*coscinia*) is a good example of this. *Endrosa* is a genus exemplifying the other direction, for we find the tergite organ retaining a somewhat definitely tubular form with a large uncus-like termination on the dorsum of the tegumen, whilst those of the sternite are simple; in neither, however, has the cingula made much progress in development. In *Ilema* we find certain very archaic characters combined with decided advance in other organs. The cingula is extraordinarily loose and unattached and is quite unconnected with the harpagones except at its point of union with the tergite; the ædœagus is generally large and has frequently complex cornuti and vesica; the tegumen is fairly advanced. whilst the harpagones are also more or less, generally more, in an advanced state of development.

Ilema griseola, Hb.,

shows the cingula in a very loose unattached condition; the sternite section consists of two long thin curved arms attached to a fine membranous ventral plate, which when at rest no doubt forms a cover to the lower part of the harpagones, these arms are attached to the lateral plates of the tegumen, and in higher groups form with them the complete cingula, which is fused into the tegumen; the uncal projection of that organ is a longish, strong, curved process with a small terminal tooth; the harpagones have a basal curved arm attached to a broad, squarish, large sclerite whose front edge is irregularly toothed, with a jagged beak-like process at its upper apex; the large ædœagus lies in a trough and has its vesica copiously shagreened, together with a cluster of semiglobular cornuti.

Ilema lurideola, Zinck..

has the cingula much smaller but unattached, the lateral plates of the tegumen smaller but the dorsal uncal development much greater; the harpagones are simpler, large ovate with a tail-like brush at the upper apex, whilst nearer the base there is a small shoulder of spines marking, I believe, the origin of the muscular attachment of the brushes. The

ædœagus though large has a simple vesica and only a couple of largish cornuti.

Endrosa aurita, Esp.

The cingula is almost normal in the sternite section and has a well-formed small saccus; it (the cingula) is more or less jointed (perhaps folded and angled would better describe it) at the tergite and continued as the cingula up to the rear of the dorsum of the tegumen, which is large both dorsally and laterally, the lateral plates being largish and triangular; the dorsum is in the shape of a broad heavy beak; the harpagones are of an irregular oblong shape, with a basal arm at the lower margin cleft almost to the cingula, and curved up around the harpago to the upper fore apex, which is very hairy, but the encircling arm is very much less so. The ædœagus lies in a trough, with a folded tube on each side, each of which terminates in a long horn, the vesica being roughly toothed, the end of the penis sheath being a hollowed short plate with a couple of short cornuti.

Euprepia striata, L.,

is placed among the *Arctiinae* on account of the presence of ocelli, the genitalia would also confirm this on the whole; the two subfamilies must, however, have very intimate and close relations.

In *striata* the cingula shows affinity with the *Lithosiinae* as it is sectioned into sternite and tergite (in the *Arctiinae* generally the cingula has advanced to form a more or less continuous collar), but it is connected with the harpagones and not unattached; the harpagones consist of two broad straightish arms terminating abruptly, the front edge being furnished with a series of short sharp teeth, the uppermost and lowermost being considerably larger than the others, at the rear of the clasps (harpagones) two bluntly wedge-shaped processes arise sharply dentate on their upper margin, these form part of the trough wherein lies the ædœagus, which has a formidably spined vesica; the tegumen is smallish (an Arctiine character), and is attached to the girdle, which broadens out in the tergite to a simple collar, to which the uncal projection of the tegumen is connected. If we consider

the *Arctiinae* apart from the *Lithosiinae*, we find perhaps more diversity in the former; *Rhodogastria*, for example, appears to retain several primitive characters, among others the tegumen appears to be almost undeveloped. The genus *Diacrisia* with its type *sannio* has advanced much, its organs being very simple, but as represented by such species as *turbida*, *pratti*, *dinawa* and their near allies, it is decidedly complicated in its genitalia. It is difficult to say what is primitive and what is of more recent development; the two sections should certainly be separated. In *Parasemia* and in *Syntomis* we find remnants of ancient characters in the superdigital processes attached to the upper margins of the harpagones, in *Syntomis* they are specially interesting in that they are asymmetrical. *Arctia* has also these organs, only they are not finger-like, being decidedly more bulky. *Callimorpha* has advanced considerably in its very simple tegumen and also in the simple structure of the harpagones. The genus *Maenas*, so far as I have as yet investigated, would appear to have the most highly developed genitalia, in that they are the simplest of all.

Diacrisia sannio, L.,

the type of the genus, has the tegumen more developed in the dorsal and subdorsal areas, with a single uncal extremity, fused with it, not articulated as usual; the harpago has a very short deeply hollowed ventral plate, and is somewhat irregular in shape; the ædœagus is elliptical, tapering smaller to the orifice, with a large vesica very finely shagreened.

It appears to me from other structural characters that such species as *turbida*, *dinawa* and all their allies must belong to another genus.

Diacrisia dinawa, B.-B.,

is a very good representative for another section of the genus, probably for a new genus; the cingula, having a simple hood-shaped saccus, is practically a continuous collar, but it shows the line of union between the tergite and sternite by a deepish indentation; the tegumen is a beak-shaped structure along the dorsal line, the anus ascending with the girdle and having its orifice just below and behind the apex of the tegu-

men. The harpagones are loosely covered on their lower margin by a deeply hollowed fine chitinous ventral plate, much more developed than in *Ilema*, and except for an excessively fine membrane practically dissociated from the girdle; in shape the harpagones are somewhat quadrangular, with a hollowed finger-like extension at the lower apex, and a largish and moderately long extension at the upper apex, where it is suddenly expanded; the ædœagus is a large curved tube, with the vesica copiously shagreened and furnished with an armature of spines in the centre.

Parasemia plantaginis, L.,

has the cingula and tegumen very similar to *Diacrisia*; the harpagones have no ventral cover plate and are more or less irregularly wedge-shaped, tapering rapidly to the front apex, which is upturned into a long powerful hook; in connection with the harpago is a basal hollowed cuneate organ at the rear (analagous to the furca in most Rhopalocera), acting no doubt as a guide to the ædœagus, whilst at the upper rear edge of the harpago is a long finger-like organ, covered on its lower margin with short spines; the ædœagus is a shortish broad tube with a heavy horn-like extension at its lower apex; the vesica is large and furnished with a dense coat of mail of spiny scales, developing at the apex into long spines.

Arctia caja, L.,

has the cingula indented at the tergite, and in this is less advanced than *Syntomis*; the tegumen is a large simple beak-like uncus; the harpagones are large with a moderately long rounded spatulate extremity; the organs at the rear of the upper edge of the harpagones are heavy and largish, irregular in shape, with an upturned hooked extremity; the ædœagus is very large, bent near the middle, and expanding outwards with an enormous vesica roughly shagreened nearly all over.

Callimorpha dominula, L.,

has the cingula very simple, slightly indented at the tergite, with the typical tegumen of the group; the harpagones have a fine membranous hairy ventral plate; the harpagones are

simple but irregular in shape; the ædœagus is large and straight, with the copious vesica heavily shagreened.

Maenas punctatostrigata, B.-B.

This genus seems to me to be very highly developed, so far as these organs are concerned, in that they are unusually simple in structure; in each case the cingula and the tegumen are fused together in the tergite as in the Rhopalocera, though the uncal extremity retains the typical form of the group; the harpagones are rounded for the basal half, but have an elongated arm projected along the upper margin; the ædœagus is of very moderate proportions with a small and simple vesica.

Rhodogastria crokeri, Macl.,

has the tegumen very undeveloped, in the present species it is of the smallest size, slightly hooded with a minute point along the dorsal line, other species have no more than the narrow collar of the cingula or girdle; the harpago is large, pyriform, broad at its narrow end with a long hook shortly barbed on its outer surface; the ædœagus at rest is short, very broad and somewhat bulbous at the rear, but when extended it is seen that the vesica is highly shagreened, with a most formidable termination closely similar in shape to a pelican's beak and as powerful looking.

The most interesting feature of the genus is, however, the development of scent organs on the outside of the harpagones; they lie curled up in a hollow on the centre of the exterior and are protected by fringes of long hair; they consist of a single long, tapering, very fine membranous sac, one in each clasp, and are studded with short-pointed setae, terminating in a fringe of longish hairs. I will do no more than make this reference to them here as I am describing them more in detail elsewhere.

Syntomis phegea, L.,

has the cingula somewhat similar to *Parasemia*, but with the saccus reduced, whilst the tegumen is extended; it has heavy laterals, the dorsum is also larger, and the uncal extremity more heavily built; the harpagones are somewhat

wedge-shaped and very hairy, whilst the upper edge is furnished with a thick fringe of spines and hairs; at the rear of the upper edge are the two digital asymmetrical organs previously alluded to, the one being much longer than the other; the ædœagus is an elliptical tapering tube of moderate length, with a linear series of hooked teeth in its centre.

The *Notodontidae* retain several very primitive characters; the cingula or girdle has advanced but little, in many genera there is no cingula proper, the laterals having their origin at the upper edge of the harpagones only, *i. e.* almost in the tergite; in others it arises lower down in the sternite, whilst in a few the girdle is more or less complete but with its articulation in the sternite and quite distinct. Again, the two sets of organs, *i. e.* the sternite and tergite, are often prominent. These all point to there being but little progress comparatively speaking in these organs.

Notodonta ziczac, L.,

is a very good general representative, even though in the tegumen it shows decided development; it is in this species almost separated from the cingula, being a narrow dorsal hood at the rear, with a considerable frontal extension well excised at its back, the front edge being strengthened by an irregularly and sharply toothed collar, which is also slightly dentate on its mid-dorsal line; in the hollow at the rear of this collar lie a pair of sclerites united by an exceedingly fine membrane and forming two lateral chitinous lobes, which are articulated to the tegumen at their upper apices; the cingula consists merely of two broad lateral plates articulated to the rear of the clasps on their upper edge, the fusion of these lateral plates with the tegumen is but slight and at its extreme rear; the harpagones are oval, wider at the fore part, with a longish horn issuing from the middle of the fore edge; the ædœagus is a straight tube having a highly curved apex, almost a broad hook, with the vesica slightly armed with a few teeth.

Lophopteryx camelina, L.,

shows its near relation to *Notodonta* both in its cingula, which is somewhat similar, and also in the other organs; the tegumen has a front collar similar to *Notodonta*, but not

toothed and of a different shape, with a heavy hook below its lower point, thus forming a pincer-like lower extremity, the hind fusion to the lateral plates of the cingula is much broader, and the anus is well under the tegumen; the harpagones are somewhat spherical with a cone-like protrusion in front, which is provided with two strong internal lobes; the saccus is prominent, and there seems to be a pseudosaccus forming the hind part of the clasp, this being very unusual; the ædœagus is a short broad tube, with the upper extremity sharply and suddenly excised.

The genus *Phalera* shows considerable deviation in many particulars; its tegumen is not excised, as both the previous genera were, at the frontal edge of the collar; the cingula is complete, but with the point of articulation with the broad lateral plates very marked, though low down in the sternite; the harpagones are large and somewhat complicated, whilst there is a deeply hollowed broad trough wherein the ædœagus lies. These points show an interesting combination of primitive and of markedly progressive characters. So far as I have as yet investigated the group it would appear to be exceptional in several points, all of which are very well shown in *bucephaloides*, the description which follows being thoroughly representative of the whole genus.

Phalera bucephaloides, O.

The cingula is practically complete in itself, with traces of the saccus in the broadish plates at the base of the sternite, above these it suddenly contracts quite narrowly and is articulated to the harpagones, as also to the broad lateral plates which ascend to the tegumen, and are fused thereto almost on the dorsum itself; the tegumen is most simple, being merely a long beak-like uncal projection; just below this attached to the laterals lies an apophysis somewhat difficult to describe, roughly it is very like a Chinese lady's foot, with the deep hollow below the instep, through the upper part of which the anus passes; the harpagones are large, of a somewhat long quadrate shape, hollowed on the lower edge and arched on the upper edge, along which lies, as a prominent part of it, a peculiar trumpet-shaped process; in the hinder

angle of the clasp lies the trough of the ædœagus, this being a broad deeply hollowed plate; the ædœagus is short, straight, moderate in width, tapering evenly but slightly to the orifice; the vesica is simple with very little armature. Time and space will, I fear, only admit of one more instance in this group.

Ichthyura pigra, Hüfn.

The cingula and the harpagones appear to be one continuous plate, the former quite narrow up to the articulation in the tergite, which is marked, the latter consisting of a peculiar almost fan-like structure, the folds (as it were of the fan) being exceedingly numerous, irregular and waved, with a dentate outer edge; in addition to this the clasp has a rearward squarish process quite independent of the girdle, which ascends to the upper edge of the fan, being completely excised in the middle, where it terminates in a finely wedge-shaped outline; the tegumen consists of a moderate hood with a bifurcate apex terminating in two small spikes, below these lie two curved horn-like sclerites with a wedge-shaped lobe attached to their lower margins—the anus protrudes below these; the ædœagus is a curved tube of moderate size, with the vesica heavily shagreened and very finely tubercled.

In many of the *Lymantriadae* the harpagones are sharply divided into two sections, the lower one occupying the horizontal position as is usual among the higher families, the upper section often rising at a very considerable angle, similar to some of the *Psychidae* and *Heterogynidae*; this combination is interesting and is very marked in some species of the genus *Euproctis*. The cingula and saccus show extraordinarily varying degrees of development, in some genera they are absent for all practical purposes, in others they are large and prominent, with the saccus very long, whilst in the simplest forms the saccus, cingula and tegumen form the continuous collar so well known in some of the dominant genera of the Rhopalocera. We thus have, as is sure to be the case in a large and world-wide family, some evidences of ancient origin, but on the whole the evidence shows decided progress in development.

Euproctis faventia, Druce.

The cingula is a continuous collar fused at the rear with the tegumen, which is rostrate, rather long and tapering to a blunt point; the saccus is of but moderate size; the harpagones have a waved vertical hind margin, developing at the lower margin into a long narrowish toothed frontal tusk, whilst the upper margin forms a still longer and stronger tusk curved in the opposite direction, densely fringed with long hairs and with the shoulder at the rear prominent and sharply and irregularly dentate; there is a small basal trough with a large rearward saccus-like process supporting the ædœagus, which is broad, curved, of moderate length, with the vesica but slightly armed with teeth.

Heracula leonina, Turner.

This genus is closely related to *Euproctis* both structurally and superficially, but the separation made by Moore seems justified by the genitalia, at least. The cingula has a long saccus and is a continuous collar expanding into ample cheeks in the tergite; the tegumen is copious though narrow in depth, with a large uncal projection precisely the shape in profile of a duck's head, with the addition of slight lateral flanges to the lower part of its bill; the ædœagal trough is large and asymmetrical at the apex, a deeply hollowed shield closed at the basal end but open and slightly bifurcate at the apex, the one side terminating in a point, whilst the other side of the apex is rounded, the frontal third below having long hairs; the harpago lying in a central position is roughly wedge-shaped, with a largish, sharply wedge-shaped lower apex deeply recessed above and a quite small upper apex somewhat similar in form; the ædœagus is large, slightly curved, with the vesica large, densely covered with robust spatulate spines, and the apex of the *ductus ejaculatorius* is also clothed with similar armature.

Orgyia antiqua, L.

The genus *Orgyia* is simpler in its armature; in comparison with other genera having sub-apterous females it would appear that this special feature had affected the male sexual armature but little, if at all, and it is therefore very interesting to

find a simple but effective apparatus; it is particularly noteworthy to see that the specialisation is towards extreme simplicity, and I think proves a high degree of development. With the exception of the following genus (*Lymantria*) we have here the simplest form of genitalia that I have yet discovered among the *Lymantriadae*—of course there are many genera that I have not at present had the opportunity of examining.

In *antiqua* the cingula is a simple collar expanding outwardly in the tergite; the tegumen is an uncal horn-like sclerite, curved slightly downwards; the harpagones are broadish lobes curved and tapering smaller towards the apex, clothed with fine short hairs, the upper margin being produced forwards and upwards into a strong highly curved hook; the ædœagus is shortish, somewhat irregular in shape, with the apical third expanding outwardly.

Lymantria novaguinensis, B.-B.

This is the simplest in form of all the genera I have yet examined in the *Lymantriadae*. I figure this species as it shows best the form and position of the genitalia, and others of the genus including *monacha* confirm it.

The cingula is a simple collar with a small saccus; the tegumen is a large curved horn-like sclerite; the harpagones are short and broad, produced a little above the middle line into a longish digital spike; the ædœagus is of moderate size, largest at the base and tapering to the apex. In some species the ædœagus is comparatively speaking quite a fine tube.

The *Lasiocampidae* show marked atavism in their armature, the only progressive character being that the sternite and tergite sections have not retained their complete set of organs, such as I consider all primitive forms probably had. ("Complete set of organs," this is a descriptive phrase, to express a difference well known to anatomists of these parts, and intended to convey the distinction between the highly specialised and simple organs prevalent in most Rhopalocera and some Heterocera, consisting of the cingula, the tegumen and anus, the harpagones and ædœagus, combined with the complete disappearance of the sternite and tergite; in comparison with the

complex organs of the lower orders where the anus in the tergite has its own armature and the ædœagus in the sternite has its own armature, though of course both must be correlated with each other.) The separation of the sternite and tergite sections being articulated generally only at the rear is perhaps the most evident atavic character.

Lasiocampa quercûs, L.

The cingula in the tergite is a broad collar, quite simple, through which passes the anus; the sternite section is angled backwards and is developed into two powerful lateral tusk-like sclerites, evidently movable vertically and to some extent laterally; these apparently are more or less aids to the harpagones, which are placed more medially and are broadish lateral plates rounded on the upper costa, but cuneate in front; the ædœagal trough is composed of a deeply hollowed sclerite, with largish lateral plates (open above), each having a broad digitate frontal process; in this hollowed area the ædœagus rests, it is a fair-sized straightish tube to a third from the tip, where it is suddenly excised, the upper portion of the tube being as it were cut off, though the tip itself is tubular and terminates in a point; the vesica is emitted through the excised portion, and is armed with a certain number of teeth, behind which it is finely shagreened.

Macrothylacia rubi, L.,

has the cingula sectioned as in *Lasiocampa*, the tergite part being very ample indeed, narrowly bridged as in the previous genus at the rear, and produced forwards at the upper fore apex into curved prominent teeth; the tegumen is absent; the harpagones, medially placed, consist of two long arms, below which are two largish lobes whose lower margins are produced into longish apical digitate processes; the ædœagus is very similar to that of *quercûs*, but narrower.

Epicnaptera ilicifolia, L.,

has the cingula composed of two almost quadrangular plates at the base of the sternite, with a smallish saccus; the tergite section is a narrow collar with a long narrow tegumen tapering to a point and hollowed out below; the harpagones

rise at a considerable angle and are somewhat boat-shaped, with the bows suddenly truncated and extended to a point at the upper apex, the front edge being sharply dentate, and the upper margin dentate in front; the ædœagus is large, terminating in a curved point, with the vesica well armed with spines and the apex of the *ductus ejaculatorius* ending in a stout, sharp, horny point.

Gastropacha quercifolia, L.,

has the cingula in the sternite composed merely of two very narrow long arms (with a small irregular saccus) articulated to the broad subovate lateral plates of the tergite section—of the cingula—high up at the rear, these plates are produced at the front upper apex into stout strong tusks bent downwards, whilst at the lower front edge they are developed into a curved flange covered, over the top, by a hairy pad; tegumen absent; the harpagones are very unusual in shape and consist of two long, broad, vertical plates, which might be mistaken at first sight for part of the cingula, the ventral part is hollowed and produced forward into blunt points sharply dentate all the way round their apical edges; two large, strong, curved, tusk-like sclerites, dentate and largely tubercled, arise from the cingula near the base in the sternite, they are, I believe, somewhat analagous to an organ I named the "Furca" in 1910, an organ universal among the *Ruralidae* and many other families; the ædœagus is a large simple bent tube, with the vesica large and finely shagreened, armed with two small clusters of spines.

Taragama rufaria, B.-B.

The cingula has exceedingly broad plates in the tergite which are not excised on the dorsum in the rear, but are widely bridged over, and so become practically the tegumen so far as the dorsum is concerned, with their upper apices produced forward into strong curved tusks; the harpago consists of a broad horizontal plate with its front edge produced into a longish stout horn at the upper apex and a shorter one at the lower apex, above which is a fair-sized rounded pad covered with stoutish long hairs; the ædœagus is a curved rapidly tapering tube of moderate length.

In *Lambessa staudingeri*, B.-B.,

a species most interesting because the female is wingless, *i. e.* the wings are strictly rudimentary, the saccus is very large and receding, and broad enough at its fore edge to be articulated in its lower half with the harpago, and in its upper half with the cingula; this appears to be near *Epicnaptera* in its general design; the harpago has a broad rounded lobe at the base projecting forward in a long arm along the upper margin; the ædœagus is broadish, curved, moderately even in width and terminating in a trumpet-shaped orifice, with a long projecting pointed lower lip; the vesica appears to have no armature.

The *Saturnidae* are highly developed and generally speaking are very simple; the cingula is a simple continuous collar with no sign of sternite or tergite sectioning. The tegumen is obvious and again simple in structure, as also are the harpagones; the ædœagal trough is the only atavic feature, this being fairly large with tusk-like sclerites. Two genera must be sufficient to illustrate their development at the moment.

In *Saturnia pavonia*, L.,

the cingula is a very narrow ribbon of chitin, rapidly expanding on the tergite so as to form an ample hooded tegumen, to which is articulated the deeply bifid uncal-like apex consisting of two very strongly curved scimitar-like arms in the front, curtained entirely in at the rear; the harpago is rounded, large, highly excised in the lower front apex, wherein is a teat-like process near the front; the ædœagal trough is a broad short collar with the upper margin developed into large tusk-like horns in the front.

Aglia tau, L.,

is very similar to *Saturnia* in some particulars; the cingula is very close but is developed more in the rear of the dorsum, whereas in *Saturnia* it is frontal; the uncus-like apex of the tegumen is, however, very much larger, very slightly excised at the extreme tip and terminating in a blunt point on each side; the harpago is large and rounded, without the fore excision, but with a long highly curved arm on the inner surface terminating in a long sharp point that is furnished with a ridge of fine short spines; the ædœagal trough is a simple

broad collar with two very long narrow arms of chitin developed into long brushes, and the ædœagus is a long narrow curved tube sharply dentate at the lower apical margin.

The *Geometridae* are as varied as any family in the general structure of their genitalia; if we take the oldest subfamilies, according to Prout, we should consider first the *Brephinae* and the *Oenochrominae.*

Brephos notha, Hb.,

retains the cingula in a well-developed, though not highly developed, form; it is almost articulated at the upper edge of the harpagones, from whence it widens and is of moderate width; the tegumen is articulated to it at the rear and is (at the rear) two-armed for a short distance, when the arms unite and become one solid dorsal process, widening outwards at first and then tapering forwards to the apex; the harpagones are fairly broad for the basal two-thirds, when they taper down rapidly in a slight curve on each side to bluntly pointed apices; the ædœagus is moderately broad and straight, with the vesica armed with a horseshoe-shaped series of powerful cornuti.

Brephos parthenias, L.,

has the cingula more robust than in *notha*; the tegumen is similarly branched at the base, but soon becomes united into one strong highly curved horn-like uncal extremity, the anus is below this; the harpagones are two long narrow arms, decidedly broader at the base but suddenly constricted, and are furnished for their ventral half with a loose outer case of very long hairs arising from the harpago near the constricted area, this half case fits more or less closely all along the narrow portion; the ædœagus is fairly long, narrower for the apical half, the vesica being furnished with cornuti, somewhat similar in shape to that in *notha*, but much finer.

Three examples of the *Oenochrominae* must suffice, in which we shall find indications of atavic characters differing, of course, in degree.

Alsophila aescularia, Schiff.,

retains the primitive cingula wherein the sternite and tergite sections are plainly visible; the articulation of the tegumen

with the girdle is evident, the tegumen being ample and broad at the base, tapering slowly to a pointed apex; the harpagones are exceedingly broad, slightly reduced at the apex, which is well and evenly excised, thus making the upper and lower apices to be somewhat pointed; the harpago is very deeply excised just below the upper margin forming a longish very narrow apophysis at that point; the ædœagus is of but moderate size, straight, with the apex shortly tapered.

Dicyclodes hieroglyphica, Warr.,

is perhaps the most interesting Lepidopteron in one respect that I have yet examined, as it shows the sternite and tergite sections (*i. e.* the reproductive and the anal armature) quite distinct and apparently unconnected with each other—this appears to be a vestige of a very ancient character. The cingula is confined to the tergite, being at the dorsum a well-developed hood, suddenly reduced and descending to the articulation of the two sections, where a pair of longish cone-shaped apophyses meet the two lateral arms and appear to be fused with them, not articulated; the apophyses are edged with a very short and fine upright fringe of hairs; the tegumen, articulated to the dorsal hood, is a single strong curved horn-shaped process; the anus lies between the laterals of the hood. The harpagones are very large and broad, irregularly waved in outline, with the upper margin developed into a fairly long broadish lobe, the two harpagones are united together along their costa by a deeply hollowed chitinous curtain that forms the support to the excessively large ædœagus, which is furnished at its upper apex with two longish stout curved horns, below and to the rear of which is the vesica, armed entirely with very short teeth, its internal area being also armed with a copious covering of teeth, whilst a long horn-like apophysis, probably in the *ductus ejaculatorius*, is very prominent.

Odezia atrata, L.,

has the cingula excessively large and broad with a small saccus and with no trace of sectional articulation; it is produced forwards below the dorsum into a pair of broad lateral lobes, between which the basal part of the tegumen is articu-

lated to it, and is projected forward into a shortish curved uncal horn; the harpagones are broadish, constricted above and below medially, but expanding again widely at the apex, the front line of the apex being slightly hollowed between its upper and lower extremities—there is a peculiar triangular ventral plate that is deeply hollowed, tapering off to a pointed extremity; the ædœagus is long and very narrow, being an almost simple tube, the vesica having but a slight armature.

The *Geometrinae* are on the whole simpler and more advanced in structure than the two previous subfamilies, but space impels certain limits, so that I must content myself with a single example, the structure, however, varies in almost every genus.

Tolmera albibasalis.

The cingula is a simple continuous collar with a smallish horn-like tegumen, from two-thirds up the girdle; in the tergite area two lateral arms arise, one on each side, to well above the tegumen, that terminate in lozenge-shaped elliptical apices densely shagreened, from which arise long thick brushes of hair; the harpagones are very long, quite unusually so, they are irregularly scimitar-shaped processes; the ædœagus is shortish, broad, with the vesica slightly shagreened and furnished with a formidable horn.

The sexual armature of the Diptera is being used generally by the present-day systematists. In a highly specialised order such as this, we should look for well-developed clasping organs. The general method of mating is as in the Coleoptera, with the male on the top of the female, but the highly nervous and extremely active habit of the insects would lead observers to expect a difference in the development of the armature, and this is the case. The clasping organs are generally very complicated and very effective, and for this it became necessary for the armature—the male being above its mate—to be enabled to be curved round into a position almost vertically below its own abdomen; this is partly provided for in the shape of the various organs, but mostly by a fine pliable extension of chitinous membrane between the terminal abdominal segment and the armature; this membrane is so fine

that it folds up and is ordinarily imperceptible, but it is capable of so long an extension when necessary as to enable the clasping organs to be emitted almost below the genital aperture of the female. The organs are extremely varied in form—one genus differing from another as is the case in the other orders; at the same time, even with my own limited experience, I think I should know whether I was examining a preparation from a Dipteron without difficulty and without being informed of the order. It is only possible for me to consider one or two species in some of the families in the two great divisions, the *Orthorrhapha* and the *Cyclorrhapha*; in the former the *Tipulidae* have the organs large and frequently complicated.

Tipula paludosa

has the tegumen, or its equivalent, in the form of a very large and deep bonnet-shaped hood, within which are two pairs of prominent lobes, the shorter ones pointed, the larger ones rounded, whilst externally is the probable equivalent of the harpagones, which are largish, somewhat spatulate processes with narrow deeply curved hooks above them; on the venter are two sensory pads furnished with short teeth, these doubtless are extended on the venter of the female and probably act as excitants. The dorsum is provided with clusters of strong spines; the ædœagus is an exceedingly long and very fine tube.

Pachyrrhina lineata.

The tegumen in the genus is only bridged over very narrowly on the dorsum, being composed of two largish rounded lateral plates, to which are articulated the harpagones; these are smallish with a solid rear, but with the apex deeply bifid, giving it a pincer-like shape, the upper jaw having a vertical, hollowed, somewhat spatulate process; the ventral pads are slightly different in outline from those in the genus *Tipula*, but are quite evidently functionally similar.

Psiloconopa meigenii,

as representing the *Limnobidae*, has its organs enclosed in a globular case divided more or less centrally. Not having

been able to examine a sufficient series, I am unable to express an opinion on them, but they are so peculiar and interesting that it seems worth while to give at least one figure of the group, though all are not enclosed in an outer case such as this.

The *Asilidae*, with varied and frequently complex organs, are a deeply interesting family from other points of view as well as the one I am considering; their mating habits should be specially observed. I must, however, confine myself to one genus.

Dioctria rufipes

has a fair-sized semi-tubular tegumen elongated into blunt points at the lower apices, with a somewhat tusk-shaped apophysis overlapping on each side; the harpagones (or their equivalent) are well developed, terminating in longish curved processes; the ædœagal ring is rather complex in its armature, the ædœagus being a simple tapering irregular tube.

The *Empidae* are of the utmost interest from the point of view now under consideration, and some of us who are not Dipterists are looking forward to Mr. Collin's classification of this important group from the anatomical standpoint. He tells me that the habit of the male is to soar up from below and seize the female from underneath. In accordance with this habit the clasping armature is developed to meet it, this being particularly the case with the ædœagus, which is upturned instead of occupying the usual position.

Empis tessellata

shows this excellently, the ædœagus being highly curved with an asymmetrical deeply bifid extremity; the tegumen is quite small and bifid with a pair of small cuneate apophyses, whilst a pair of very large lateral plates (reminding one of the valves of the *Papilionidae* and of some of the *Pieridae*) cover each side. I will not refer to more genera as Mr. Collin will shortly, I hope, deal with the whole subject of this group.

Of the *Dolichopodidae* I will only figure the one species

Dolichopus ungulatus.

The tegumen has an extraordinarily developed uncal apophysis with rather complex armature below its median

area, for both of which structures the figure will tell much more than words. The harpagones are of a fair size with their lower extremity slightly elongated into short round apices, from the centre of which a short spine is emitted; the ædœagus is a very long narrow tube curved right round near its origin. The whole armature is peculiarly interesting, and a study of the family in this particular should prove of the greatest value.

In the *Cyclorrhapha*

the *Syrphidae* are provided with a very varied and well-developed apparatus. If, as seems probable, mating is by capture, and the hovering habit would seem to point to this, then it is evident that it would be an advantage to the race to have very efficient clasping organs.

Chrysotoxum cautum.

The tegumen is asymmetrically deeply bifid, the peculiar feature of this asymmetry being that the left side (looking towards the telum) is always decidedly shorter, with the curved apex shorter and heavier. It appears to me that the tegumen in this and other similar cases must replace the harpagones functionally, these organs (the harpagones) being so reduced in size that their power of grasping must be very small, in this species they are cone-shaped and are articulated to the basal plates. The girdle as a defined organ is practically absent in this order; the ædœagus is smallish, gradually tapering to a bluntly pointed apex. At the base of the tegumen on the dorsum are two small lobe-like processes covered with fine short hairs.

Eristalis pertinax.

This genus also has the tegumen deeply bifid, the lobes just referred to in the previous description are larger and more prominent, whilst the bifid arms of the tegumen are spatulate and not so large; the harpagones are quite insignificant, close on the venter, and terminate in a fine point.

Sericomyia borealis

retains the small lobes in the rear of the tegumen, which, however, is not bifid but has a large uncal termination ending

in a longish straight horn curved well downwards, as are all these parts in the Diptera; the harpagones are small rounded sclerites between which lies the ædœagus; this is shown in the figure projecting below the lower margin of the harpagones.

I have only time to consider three sections of the important group *Schizophora*, viz. the *Anthomyidae*, the *Trypetidae* and the *Tachinidae*. In the former,

Hylemyia strigosa

has quite small armature—the species is of course a small insect, but even so the armature is small and simple, the tegumen being deeply bifid, and it quite evidently supplants the harpagones functionally; the harpagones are quite small, divided more or less into two sections, the upper one scroll-shaped and the lower rather cuneate; the venter of the end abdominal segment is projected forwards into two rounded sclerites, one on each side, which carry near their upper apex a long strong curved spinous hair articulated in a definite socket.

Tephritis miliaria,

representing the latter of the two subfamilies already mentioned. In this the tegumen and the harpagones or their equivalents appear to form one continuous organ, the former being merely a broad collar quite continuous with the harpagones, which are large and prominent and somewhat cuneate; within these latter are a pair of sclerites hanging down more or less parallel with the harpagones. The ædœagus is the somewhat coiled fine tube as seen in the figure. The *Tachinidae*, if we may judge from the genitalia, must be closely related to the previous family *Anthomyidae*.

Pollenia rudis

is close to *Hylemyia* in the general " build " of its armature; the tegumen is very similar in shape, but it is slightly bifid, and it has below it a pair of prominent sclerites larger than the uncal portion of the tegumen; the ventral sclerites are reduced to a pair of somewhat cone-shaped pads, of but moderate size; the ædœagus is largish, deeply curved, and is emitted from a ring of chitin which at its upper margin is

produced forwards into a longish horn—this may be analagous to the furca in the Lepidoptera.

Dexiosoma caninum

has very insignificant armature; the tegumen is merely a small horn-like uncal projection, on each side of which is a similar-shaped sclerite somewhat larger, whilst the ventral pads are much reduced in size.

Panzeria rudis

follows the same line of structure; the tegumen is largish and finely cuneate, below it are a pair of large, prominent, somewhat cone-shaped sclerites; the ædœagal ring is furnished with a pair of curved apophyses, rounded at the apex at its upper margin, and a pair of tusk-like apophyses, the small ædœagus protruding between the two; the ventral pads on the terminal abdominal somite are three in number, one on the venter and one on each side of it, they are small but well developed.

Eudoromyia magnicornis

differs in some particulars; the largish tegumen has the long uncal projection terminating in a fine hook, below it are a pair of large cheeks with an arm-like process bent round their fore edge; the ædœagal ring is of moderate size, and the ventral pads are fairly prominent.

Phorocera caesifrons

has a different type of armature; the tegumen is large, being a very prominent hollowed pallate process curved into a rounded apex; directly below it at the hinder edge are two somewhat rounded cheeks with a fine digitate process emanating from them, whilst the ædœagal ring has apophyses of quite small dimensions.

Sarcophaga carnaria.

In this genus the external organs consist of little more than the tegumen, which in its uncal apophysis is semi-cylindrical, the front apex being excised and tapered off into two cuneate apices; immediately below the tegumen are

a pair of somewhat cone-shaped pads, below which is the ædœagal ring with its two pairs of tusk-like apophyses that appear to be characteristic of the family; the ædœagus is very irregular in outline with a heavily armatured apex. The sensory pads on the venter of the terminal abdominal somite are rounded and furnished with long strong hairs.

The Hymenoptera have these organs developed and specialised to a considerable extent; the late Edward Sanders dealt with them in our Transactions as long ago as 1884, and I only propose to refer to one or two types of the *Aculeata* so that I may demonstrate the line of specialisation in *Vespa* and in some of the *Formicidae*.

Vespa germanica.

The organs are developed almost entirely along the lateral line; they are very ample, indeed so ample that they extend on to the lower part of the dorsum and also on to the venter of the female; there are apophyses on each of these margins, those on the dorsal edges being long, irregular, and thickly haired; the ædœagus is longish with a large basal area, the apical half being a moderately broad tube with barbed apex.

Vespa sylvestris

is very similar to *germanica*, as we should expect, but is simpler, whilst the lateral armature is different in shape; the ædœagus also is different in small particulars.

Formica rufa, L.,

has the development also almost entirely along the lateral line, as also have others of the group, it is, however, flat, not curved, that is to say that the lateral plates are apparently flat; but to make up for the loss of power involved by being unable to curve around the abdomen of the mate—as in *Vespa* —the internal surface is supplied with strong hooks or saws or both, so that the grasping capabilities must be great.

Formica fusca, L.,

is very similar indeed to the preceding species, but the internal hooks are different in shape, as also the lateral plates, which are also smaller.

Myrmica ruginodis, Nylander,

is quite different in general aspect, though the development is lateral; the apophyses within the lateral plates are, however, as prominent as in *Formica*, though somewhat smaller.

Lasius niger, L.

The organs in this genus whilst still lateral are different in shape and in various particulars. I refrain from describing any of these, as I hope my friend Mr. Donisthorpe will be bringing out his book on this group of insects very shortly, when no doubt he will deal with this side of the subject.

In summing up, so far as my own observations go, I find that the lowly orders such as Thysanura and Collembola have no external clasping organs, there are certain stylets and sensory gonapophyses that are probably excitants. Lubbock (the late Lord Avebury) states that he noticed very little courtship evidenced among them, the most he saw being a slight caressing with the antennae. I should here say that I quite expected to be able to present a more complete set of examples for your consideration, as I had been promised material especially among the less-known orders, but alas, the war entirely upset these arrangements, and now some of my friends are at the front.

Turning to the Orthoptera (one of the orders I have been disappointed in), there is a combination of primitive with progressive characters; the cerci are strongly developed, whilst the clasping organs are present but probably are inadequate to be of much functional use.

I believe that the Thysanoptera have their genitalic characters somewhat on the lines of those obtaining in the Thysanura, and that they are confined to sensory gonapophyses and stylets.

It will have been seen that there are two quite distinct sets of organs, viz. the ædœagus with its various parts, and the external clasping organs, the latter being modifications in all probability of the ninth and tenth abdominal segments. Originally, I have little doubt that the anus had its own protective armature, whilst the ædœagus had its own armature, the former being confined to the tergite and the latter to the

sternite. The ædœagus is common to all insects, and is exceedingly varied in its states of development. The clasping organs do not obtain in all orders, as has been already shown. In the Odonata the external organs have developed along entirely different lines, owing no doubt to their quite different economy, but on the second segment of the abdomen there are organs for grasping the ovipositor of the female, and these may be in process of further development; this line of study, already begun by some American morphologists, will, I hope, be deeply probed into. The old and vast order of Coleoptera present a field of research of the very utmost importance and of the utmost interest. I believe it is probable that clasping organs, as understood by Lepidopterists, Trichopterists and Dipterists scarcely exist. There are large external sclerites in certain groups, for instance in the *Telephoridae*, in some of the weevils such as the genera *Psalidura* and *Ichthyurus*, as already referred to, but I am very doubtful if they are homologous with the complex external organs of other orders. In the Hymenoptera also comparatively little has been done in this line of study, in spite of the fact that beautiful and highly complicated structures are common, and that the aculeate section has the additional interest of being provided with a sting emitted from the telum. The European war has prevented me from getting specimens of several of the less popular and of the lower orders that I had quite expected to be able to figure, but as regards the Trichoptera, the Lepidoptera and the Diptera, it is evident that the external modifications of the ninth and tenth abdominal segments are very ancient, and that they have persisted quite as strongly where *apparently* there was no special need for their persistence—I refer, of course, to those species of Lepidoptera with so-called subapterous females. It appears to me to be almost certain that these organs are modifications of the ninth and tenth abdominal segments, the Micropterygidae and the Trichoptera (in many cases) seem to prove this in the formation of the hind section of these organs, that section being an almost complete ring, like the other abdominal segments, only being (to-day) without the division between the tergite and sternite, and I

am quite satisfied that they are of very real value and assistance not only from the phylogenic but also from the taxonomic point of view.

If we now consider the ædœagus, it will be necessary to speak with extreme caution. So far as the Lepidoptera and the Trichoptera are concerned I believe it to be as valuable a character as the external organs, but here I must explain that I refer in this statement to that part of it defined by Rothschild and Jordan as the penis sheath, *i. e.* the outside hard chitinous case. I am fairly sure that the *ductus ejaculatorius* with its tip which Pierce has named the " vesica " are by no means satisfactory or safe characters on which to rely. I do not mean that in some genera they may not be useful, but I have found quite frequently that whilst one species of a genus may have considerable armature in the vesica and also in the *ductus ejaculatorius*, another species in the same genus may have none or next to none, and this would to some extent agree with the view of my friend, G. A. K. Marshall, who tells me that he knows of Coleoptera in which the ædœagus is of the very simplest possible form, and that it would be almost impossible to differentiate one genus from another in some such cases. I take it, however, that such cases would occur only where the organ is extremely simple, and it would follow almost for a certainty that directly progressive development began then differentiation would begin also, and this we see in Sharp and Muir's valuable treatise, the senior author of which tells me that he is still finding marvellous and diverse developments in the vesica of the order in question, and moreover that he considers this department of entomology is destined to become of the first importance; an opinion that I most thoroughly concur in. Perhaps it may be thought that whilst I have been able to show different degrees of development in the insects themselves, yet I have not gone very far in argument, and up to a point this is true, but the facts of the case lie in the figures presented before you, and to a large extent may I not say that they speak for themselves? Nevertheless it appears to me to be correct —or at least most probably correct—to say that, originally, the anus and the ædœagus had each its own armature, pro-

bably separated, and that the present more or less simpler development has been evolved therefrom. Those families, popularly called the lower or the older groups, have all of them rather complex organs, with evidences of vestiges of a separated anus; as development progressed, its progression should be towards simplicity, for it is hard to persuade oneself that great complexity in these parts is for the benefit of the race, the simpler and the more effective the better for the species; in most of the Heterocera there are signs in this direction. If we consider the Rhopalocera it is much more in evidence, but perhaps it is most interesting to find that one of the oldest families has quite the simplest armature; I refer to the *Ruralidae* or *Lycaenidae*, where the armature and the ædœagus are, generally speaking, of the simplest pattern I know of, taking the whole family into consideration, among all the Lepidoptera, and perhaps next to them come the *Erycinidae*. I am unable to speak with authority on such orders as the Diptera and the Hymenoptera, but in both of these orders, where long and sustained flights are the habits generally obtaining, we must be prepared for deviation from the standard of the Lepidoptera; in both groups we find the armature complex and powerful.

Each order must be worked out on its own lines, the economy of the insects necessarily affecting their structure to some extent. It may be that those who are not well acquainted with this line of study will find it difficult at first to fully comprehend all the structures, this can be, however, remedied by any one who desires to investigate the subject; the initial difficulties are by no means great, all that is required is patience and a more or less delicate touch, with these and good eyes any one can overcome the difficulty of technique in the preparation of the necessary microscopic slides. This being accomplished the field of research is great, and I believe is destined to become of the utmost importance in the near future.

Perhaps I should say a word on the best position for observation of these organs. Without any doubt at all the natural position should be taken, and in the Lepidoptera, the Trichoptera and the Neuroptera that is the profile view; in

the Diptera, also, the profile view is almost necessitated by the organs themselves. I have discussed this question with some of the best Continental insect anatomists, and they all agree that the profile position is the essential point of view. It is evident that in this, the natural position, all the organs are co-ordinated together as nature made them, as they are used by the insects themselves, so that the relativity of part to part is at once apparent to the eyes of the observer. I do not mean to say that it is never advisable to make other preparations, every position is necessary for one's own instruction; vertical and flat, transparent and opaque are all needed sometimes where it may be possible, but the educative and natural position is the profile, and it should be placed in a cell with only sufficient pressure from the coverglass to enable the mount to retain its posture.

It only remains for me now to press this line of research strongly on my brother entomologists, there is a vast field to be explored which will prove of the greatest interest to the investigator and of the utmost value to science generally.

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GENITALIA OF THYSANURA, ORTHOPTERA AND ODONATA.

Explanation of Plates.

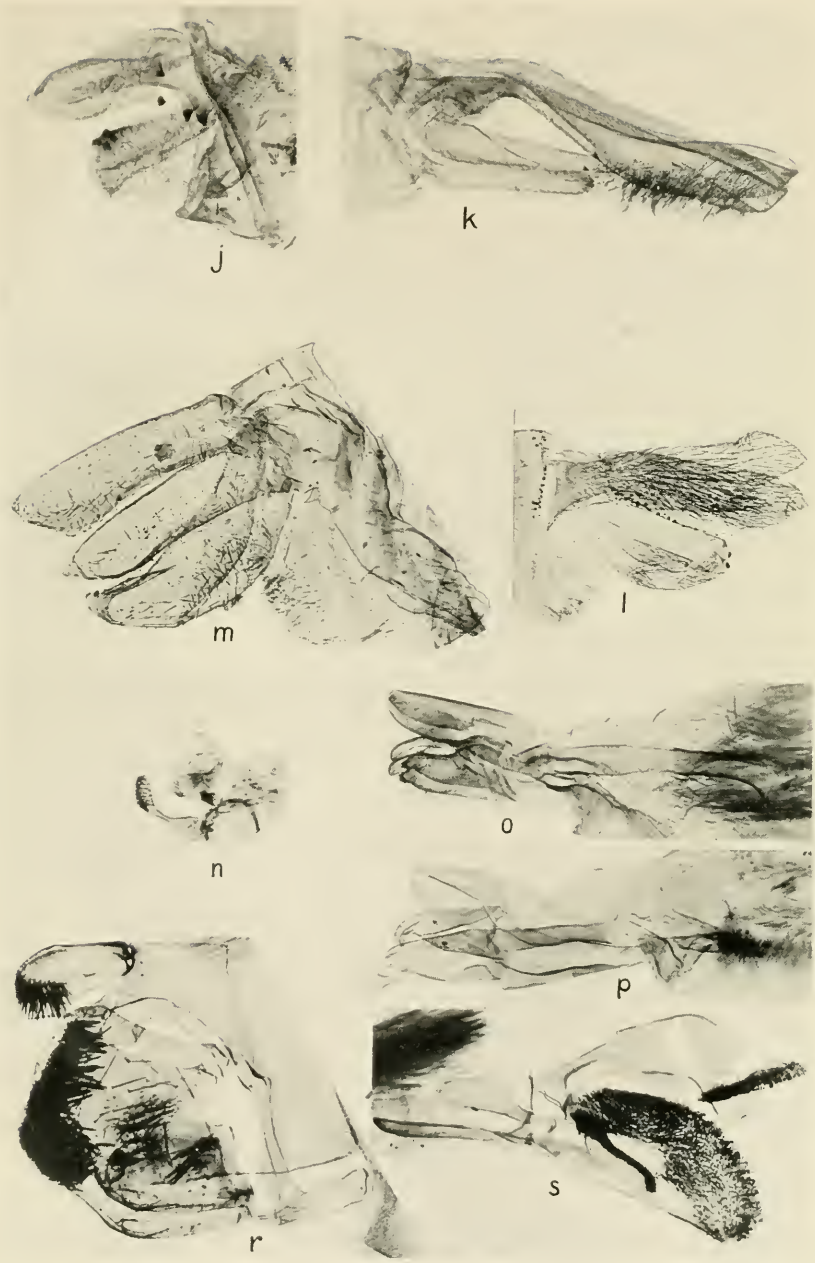
All the figures have been magnified × 30, except where on account of the large size it is otherwise stated, and then reduced uniformly by a third.

PLATE C.

a. *Petrobius maritimus.*
b. *Petrobius brevistylis.*
c. *Periplancta americana.*
d. *Calopteryx maculata.*
e. *Hetaerina americana.*
f. *Rhinocypha biseriata.*
g. *Lestes rectangularis.*
h. *Onychogomphus forcipatus.*
i. *Dromogomphus spinosus.*

Explanation of Plate D.

j. *Cordulegaster annulatus.*
k. *Epiaeschna heros.*
l. *Libellula quadrimaculata.*
m. *Sympetrum sanguineum.*
n. *Micropteryx calthella.*
o. *Clania variegata.*
p. *Pseudoclania dinawaensis.*
r. *Trochilium crabroniformis.*
s. *Aegeria ichneumoniformis.*



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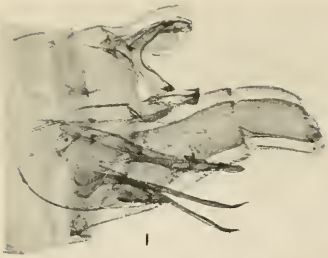
GENITALIA OF ODONATA AND LEPIDOPTERA.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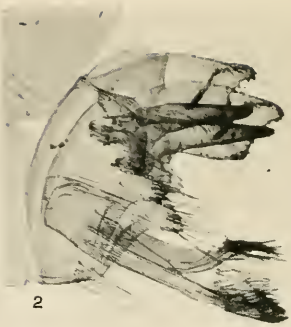
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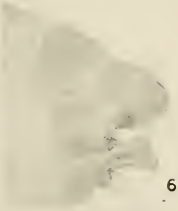
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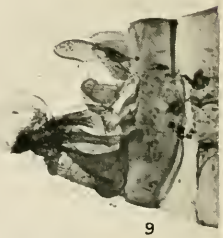
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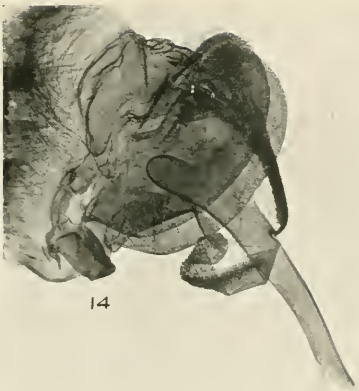
GENITALIA OF TRICHOPTERA

Explanation of Plate E.

1. *Rhyacophila dorsalis.*
2. *Limnophilus flavicornis.*
3. *Anabolia nervosa.*
4. *Stenophylax stellatus.*
5. *Leptocerus aterrimus.*
6. *Brachycentrus subnubilis.*
7. *Glyphotaelius pellucidus.*
8. *Plectrocnemia conspersa.*
9. *Halesus auricollis.*

Explanation of Plate F.

10. *Eriocrania purpurella.*
11. *Micropteryx seppella.*
12. *Hepialus humuli.*
13. *Ino geryon.*
14. *Zygaena achilleae.*
15. *Heterusia pratti.*
16. *Drepana harpagula.*



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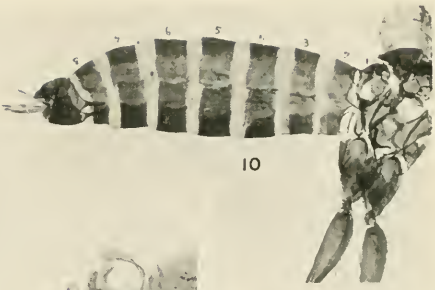

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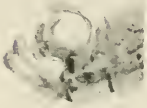

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GENITALIA OF LEPIDOPTERA (HETEROCERA).

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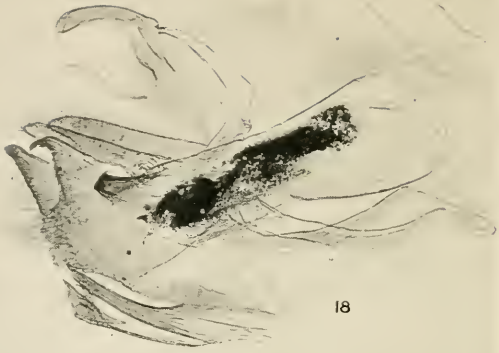

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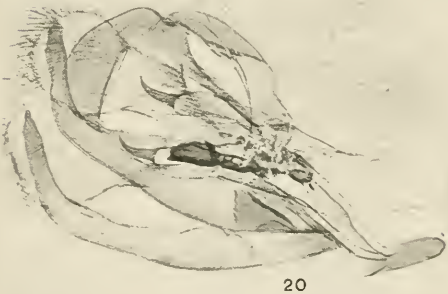

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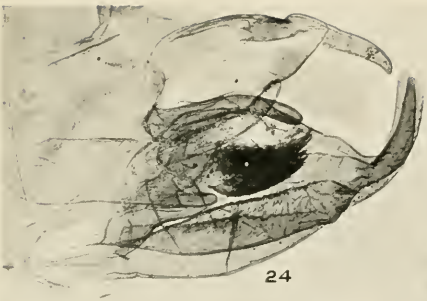
GENITALIA OF LEPIDOPTERA (HETEROCERA).

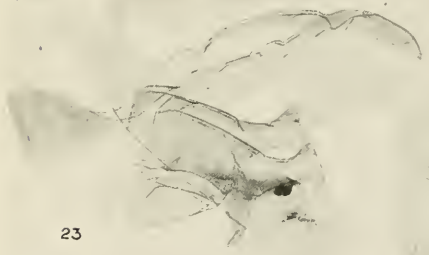
Explanation of Plate G.

17. *Drepana falcataria.*
18. *Ilema griseola.*
19. *Ilema lurideola.*
20. *Setina aurita.*
21. *Euprepria striata.*
27. *Maenas punctatostrigata.*

Explanation of Plate H.

22. *Diacrisia sannio.*
23. *Diacrisia dinawa.*
24. *Parasemia plantaginis.*
25. *Arctia caja.*
26. *Callimorpha dominula.*
28. *Notodonta ziczac.*
29. *Lophopteryx camelina.*





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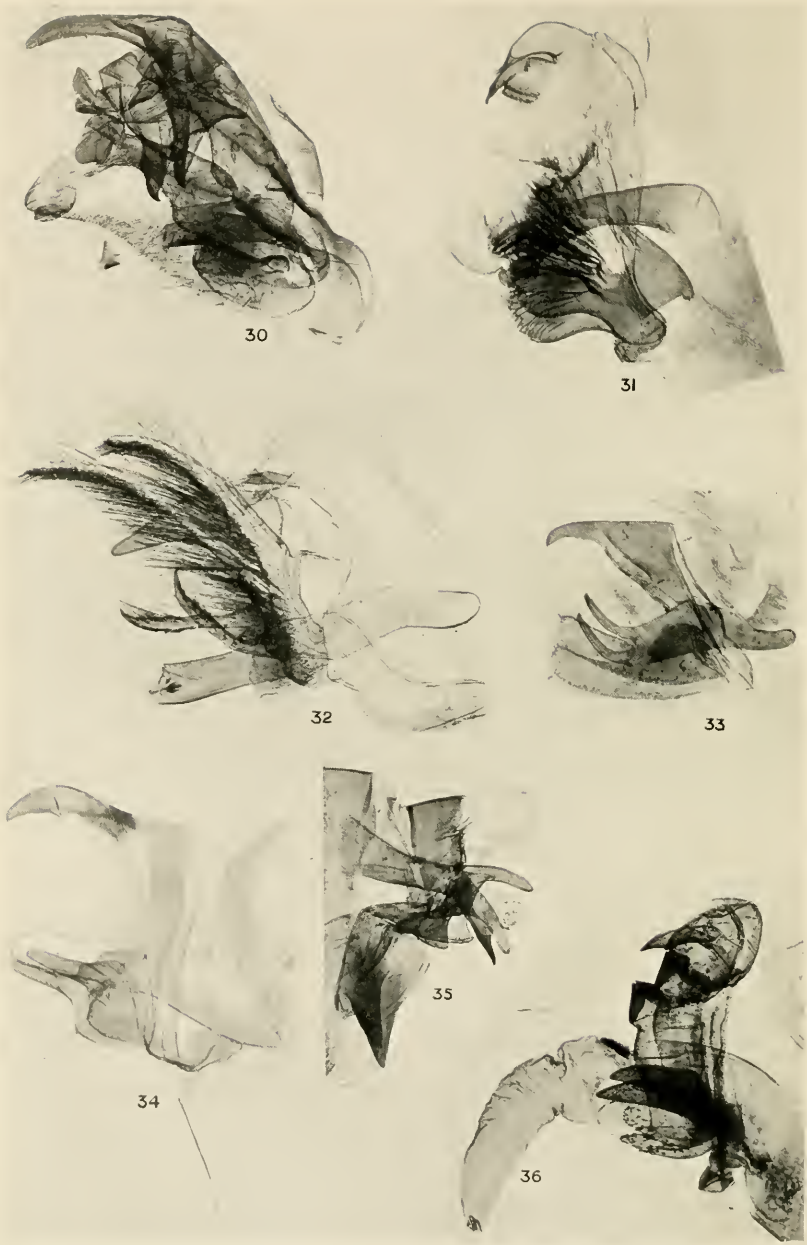
GENITALIA OF LEPIDOPTERA (HETEROCERA).



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GENITALIA OF LEPIDOPTERA (HETEROCERA).

Explanation of Plate I.

30. *Phalera bucephaloides.*
31. *Pygaera pigra.*
32. *Euproctis faventia.*
33. *Orgyia antiqua.*
34. *Lymantria novaguinensis.*
35. *Lasiocampa quercus.*
36. *Gastropacha quercifolia.*

Explanation of Plate J.

37. *Saturnia pavonia.*
38. *Aglia tau.*
39. *Ocypus fuscatus.*
40. *Staphylinus erythropterus.*
41. *Achenium depressum.*
42. *Othius fulvipennis.*

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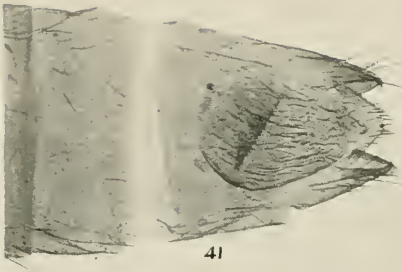

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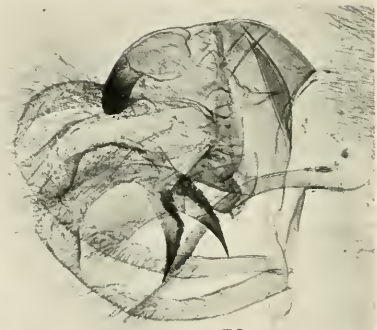

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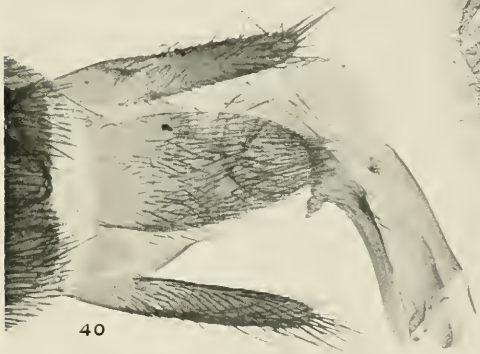

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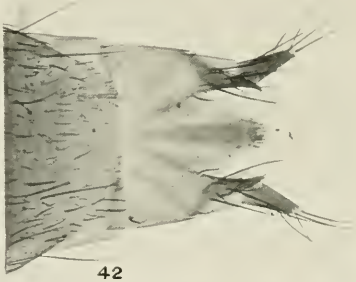

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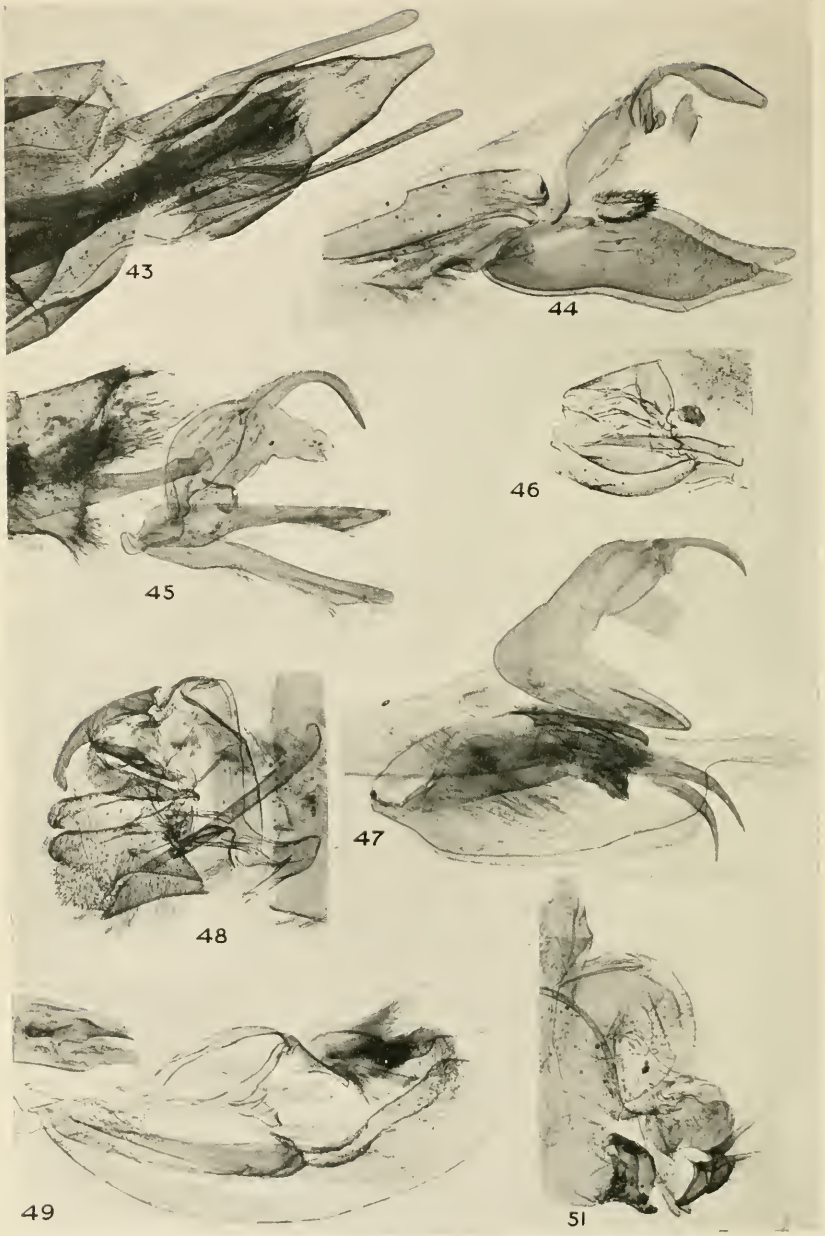
GENITALIA OF LEPIDOPTERA AND COLEOPTERA.



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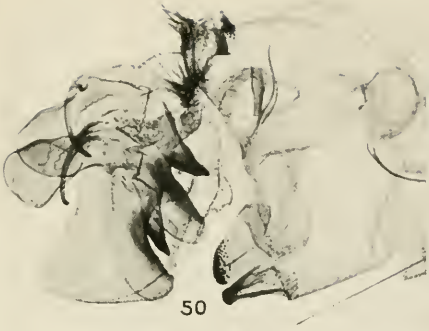
GENITALIA OF COLEOPTERA, LEPIDOPTERA AND DIPTERA.

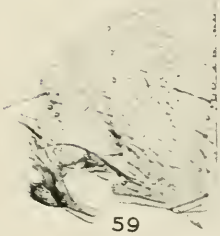
Explanation of Plate K.

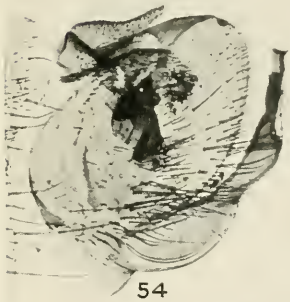
43. *Silpha laevigata.*
44. *Brephos notha.*
45. *Brephos parthenias.*
46. *Alsophila aescularia.*
47. *Dicyclodes hieroglyphica.*
48. *Odezia atrata.*
49. *Tolmera albibasis.*
51. *Pachyrrhina lineata.*

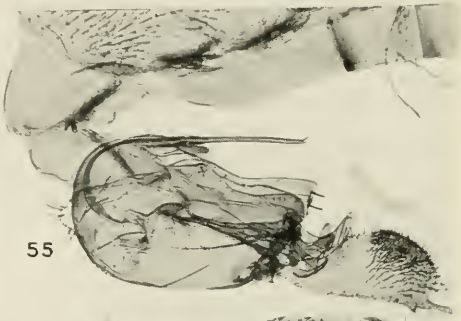
Explanation of Plate L.

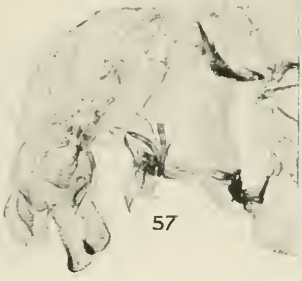
50. *Tipula paludosa.*
52. *Psiloconopa meigenii.*
53. *Dioctria rufipes.*
54. *Empis tessellata.*
55. *Dolichopus ungulatus.*
56. *Chrysotoxum cautum.*
57. *Eristalis pertinax.*
58. *Sericomyia borealis.*
59. *Hylemyia strigosa.*











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61


63

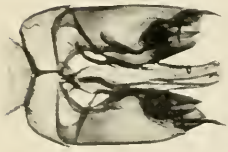

60

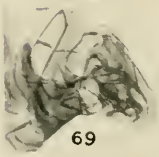

62


64


65


66


68


69

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Genitalia of Diptera and Hymenoptera

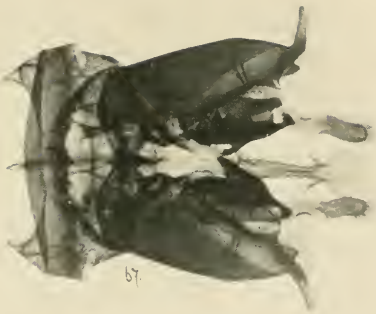
Explanation of Plate M.

60. *Tephritis miliaria.*
61. *Pollenia rudis.*
62. *Dexiosoma caninum.*
63. *Panzeria rudis.*
64. *Eudoromyia magnicornis.*
65. *Phorocera caesifrons.*
66. *Sarcophaga carnaria.*
68. *Vespa sylvestris.*
69. *Formica rufa.*

Explanation of Plate N

67. *Vespa germanica.*
70. *Formica fusca.*
71. *Myrmica ruginodis.*
72. *Lasius niger.*
73. *Ichthyurus pachygaster.*
74. *Cossus cossus* (key to organs of Lepidoptera).
75. *Dytiscus marginalis* (leg of the beetle).

Figures e and 75 are magnified × 7. Figures k, 23, 36, 67, 68, 69, 74 × 10. Figures h, j, l, 25, 29, 30, 35 and 45 × 15. Figures o, p, 10, 14, 15, 21, 24, 26, 28, 32, 38, 47, 49, 58 × 20. Figures r, s, 44, 50, 57, × 25. All the other figures are magnified × 30.



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GENITALIA OF HYMENOPTERA AND OTHER ORDERS,
ALSO LEG OF DYTISCUS.

GENERAL INDEX.

The Arabic figures refer to the pages of the 'Transactions'; the Roman numerals to the pages of the 'Proceedings.'

The President's Address is not separately indexed.

GENERAL SUBJECTS.

SPECIAL INDEX.

The Arabic figures refer to the pages of the 'Transactions'; the Roman numerals to the pages of the 'Proceedings.'

ERRATA.

TRANSACTIONS.

Page 311, line 10 from top, *for* monogeneutic *read* monogoneutic.
Page 311, line 11 from top, *for* digeneutic *read* digoneutic.
Page 312, line 12 from bottom, *for* digeneutic *read* digoneutic.
Page 312, line 4 from bottom, *for* monogeneutic *read* monogoneutic.
Page 323, line 3 from top, for *phlexippus* read *plexippus*.
Page 332, line 3 from top, for *Aecophilla* read *Oecophylla*.
Page 333, lines 6 and 11 from bottom, for *Fenisca* read *Feniseca*.
Page 335, line 15 from top, for *Habrotis* read *Habrodius*.
Page 337, line 2 from top, for *Fenisca tarquinnius* read *Feniseca tarquinius*.

PROCEEDINGS.

Page xv, lines 16 and 18 from top, for CLERKELLA read CLERCKELLA.
Page lxxxii, line 3 from bottom, for *Epienaptera* read *Epicnaptera*.

PLATES XXVIII AND XXIX.

The legends and descriptions of these plates are correct, but the numbers of the blocks have been transposed.

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Founded, 1833. Incorporated by Royal Charter, 1885.

PATRON—HIS MAJESTY THE KING.

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CONTENTS OF PART V.

MEETINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON,

11 CHANDOS STREET, CAVENDISH SQUARE, W.

FOR THE

SESSION 1915–1916.

Wednesday, May		5
,, June		
,, October		6
,, ,, ...		20
,, November		3
,, ,, ...		17
,, December		1
1916.		
,, January (ANNUAL MEETING)		19

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