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19

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OF

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THE

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OF THE

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1917.

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1888 Fremlin, H. Stuart, M.R.C.S., L.R.C.P., *Markwith, Nether-street, North Finchley.*
1910 Frisby, G. E., 31, *Darnley-road, 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, M.A., (Council, 1916–), *Board of Agriculture and Fisheries, Northumberland-avenue,* W.C. 2.

1876 Fuller, The Rev. Alfred, M.A., *The Lodge*, 7, *Sydenham-hill, Sydenham*, S.E. 26.
1898 Fuller, Claude, Government Entomologist, *Pietermaritzburg, Natal.*
1887 Gahan, Charles Joseph, M.A., D.Sc., President, (V.-Pres., 1916; Sec., 1899–1900; Council, 1893–5, 1901, 1914–), 8, *Lonsdale-road, Bedford Park*, W. 4; and *British Museum (Natural History), Cromwell-road*, S.W. 7.
1890 Gardner, John, *Laurel Lodge, Hart, West Hartlepool.*
1901 † Gardner, Willoughby, F.L.S., F.S.A., *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. 3.
1906*†Gibbs, Arthur Ernest, F.L.S., F.Z.S., (Council, 1912–14, 1917), *Houndspath, Upper Marlborough-road, St. Albans.*
1915 Gibson, Arthur, *Entomological Branch, Dept. of Agriculture, Ottawa, Canada.*
1908 Giffard, Walter M., *P.O. Box* 308, *Honolulu, Hawaii.*
1907 Giles, Henry Murray, Head Keeper of Zoological Gardens, *South Perth, W. Australia.*
1904 Gilliat, Francis, B.A., *Windham Club, St. James's-square, Piccadilly*, S.W. 1.
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, Capt. A. Mainwaring, *Brislington House, nr. Bristol.*
1904 Goodwin, Edward, *Canon Court, Wateringbury, Kent.*
1898 Gordon, J. G. McH., *Corsemalzie, Whauphill S.O., Wigtownshire.*
1898 Gordon, R. S. G. McH., *Drumblair, Inverness.*
1855 Gorham, The Rev. Henry Stephen, F.Z.S., (Council, 1882–3), *High-croft, Great Malvern.*
1913 Gough, Lewis, Ph.D., Entomologist to the Govt. of Egypt, *Dept. of Agriculture, Cairo.*
1909 Gowdey, Carlton C., B.Sc., *Biological Laboratory, P.O. Box* 5, *Kampala, Uganda, E. Africa.*
1914 Graveley, F. H., *The Indian Museum, Calcutta.*
1911 Graves, Capt. P. P., *Turf Club, Cairo, Egypt.*
1891 † Green, E. Ernest, F.Z.S., (V.-Pres., 1915; Council, 1914–16), *Way's End, Beech-avenue, Camberley.*
1910 Green, Herbert A., *The Central Fire Station, Durban, Natal.*
1894 Green, J. F., F.Z.S., 49, *Victoria-road, Kensington*, W. 8.
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., *The Croft, Carol Green, Berkswill, Coventry.*
1906 Gurney, Gerard H., *Keswick Hall, Norwich.*

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

1912 Hacker, Henry, *Butterfield-street, Bowen Bridge-road, Brisbane, Queensland.*
1906 Hall, Arthur, 7, *Park-lane-mansions, Croydon.*
1890 † Hall, Albert Ernest, c/o *City Librarian, Surrey-street, Sheffield.*
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, *St. Ronans, Wilston, Brisbane, Australia.*
1915 Hamm, Albert Harry, 22, *Southfield-road, Oxford.*
1891 Hampson, Sir George Francis, Bart., B.A., F.Z.S., (V.-Pres., 1898 ; Council, 1896–8), 62, *Stanhope-gardens,* S.W. 7.
1891 Hanbury, Frederick J., F.L.S., *Brockhurst, E. Grinstead.*
1905 † Hancock, Joseph L., 5454, *University-avenue, Chicago, U.S.A.*
1916 Hannyngton, Frank, c/o Messrs. Parry & Co., *Madras, India.*
1917 Harding, William G., *Ascham, St. Vincent's Meads, Eastbourne.*
1903 Hare, E. J., 4, *New-square, Lincoln's Inn,* W.C. 2.
1904 Harris, Edward, 50, *Wilson-street, Finsbury,* E.C.
1910 Harwood, Philip Bernard, 2, *Fern Villas, Melford-road, Sudbury.*
1910 Hawkshaw, J. C.
1913 † Hawkshaw, Oliver, 3, *Hill-street, Mayfair,* W. 1.
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. 5.
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.*
1917 Hockin, John W., *Castle-street, Launceston.*
1914 Hodge, The Rev. Prebendary Edward Grose, *The Vicarage, Paddington,* W. 2.
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., *Carnegie Museum, Pittsburgh, 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., 7, *Harley-street*, W. 1.

1897 Horne, Arthur, *Bonn-na-coile, Murtle, Aberdeenshire.*

1903 Houghton, J. T., 1, *Portland-place, Worksop.*

1907 † Howard, C. W., *Canton Christian College, Canton, China.*

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.*

1907 Hughes, C. N., 178, *Clarence Gate-gardens, Regent's Park*, N.W. 1.

1912 Huie, Miss Lily, *Hollywood, Colinton-road, Edinburgh.*

1917 Hunter, David, M.A., M.B., *The Coppice, Nottingham.*

1897 Image, Prof. Selwyn, M.A., (Council, 1909–11), 78, *Parkhurst-road, Camden-road*, N. 7.

1912 † Imms, A. D., D.Sc., B.A., F.L.S., *Entomological Dept., The University, Manchester.*

1908 Irby, Col. Leonard Paul, *Evington-place, Ashford, Kent.*

1907 Jack, Rupert Wellstood, Government Entomologist, Department of Agriculture, *Salisbury, Rhodesia.*

1917 Jackson, Miss Dorothy J., *Swordale, Evanton, Ross-shire.*

1907 Jackson, P. H., 112, *Balham-park-road*, S.W. 12.

1907 Jacobi, Professor A., Ph.D., Director of the R. Zoological and Anthrop.-Ethnographical Museum, *Dresden, Saxony.*

1911 Jacobs, Capt. J. J., R.E., 15, *Paget-street, Gillingham, Kent.*

1910 Jacobs, Lionel L., c/o Algoma Steel Corporation, *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., 44, *Great Russell-street, Bloomsbury*, W.C. 1.; and *Cestria, Claremont-road, Highgate*, N. 6.

1898 Janson, Oliver J., *Cestria, Claremont-road, Highgate*, N. 6.

1912 Jardine, Nigel K., *Summerhill House, Willesborough, nr. Ashford, Kent.*

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. 18.

1909 Jepson, Frank P., *Department of Agriculture, Suva, Fiji Islands.*

1917 Jermyn, Col. Turenne, *Highcliffe, Weston-super-Mare.*

1886 John, Evan, *Llantrisant S.O., Glamorganshire.*

1907 Johnson, Charles Fielding, *West Bank, Didsbury-road, Heaton Mersey.*

1917 Johnson, Jesse, 16 and 17, *Marston-road, Stafford.*
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., Treasurer, 1904– , (V.-Pres., 1912, Council, 1898–1900), *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. 2.
1910 Joy, Ernest Cooper, *Eversley, Dale-road, Purley.*
1902 Joy, Norman H., M.R.C.S., L.R.C.P., *Theale, Berks.*
1913 Junk, Wilhelm, 68, *Sachsische-strasse, Berlin*, W. 15.

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, Prof. James J. F.-X., 1, *Athole Gardens-terrace, Kelvinside, Glasgow.*
1913 Kirby, W. Egmont, M.D., *Hilden*, 46, *Sutton Court-road, Chiswick*, W. 4.
1917 Kirkpatrick, Thos. W., *The Deanery, Ely*, and *Room* 270, *War Office, Whitehall*, S.W.
1889 Klapálek, Professor Franz, *Karlín* 263, *Prague, Bohemia.*
1887 † Klein, Sydney T., F.L.S., F.R.A.S., *Hatherlow, Raglan-road, Reigate.*
1917 Kusnezov, Nicholas J., *The Imperial Academy of Sciences, Petrograd.*

1916 Laing, Frederick, *Natural History Museum, Cromwell-road*, S.W. 7.
1910 Lakin, C. Ernest, M.D., F.R.C.S., 2, *Park-crescent, Portland-place*, W. 1.
1911 † Lamborn, W. A., M.R.C.S., L.R.C.P., *Zomba, Nyasaland, E. Africa.*
1917 Langham, Sir Charles, Bart., *Tempo Manor, Co. Fermanagh.*
1916 Latta, Prof. Robert, D.Phil., *University of Glasgow.*
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.*

1910 LEIGH, H. S., *The University, Manchester.*

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., *South African Museum, Cape Town, Cape of Good Hope.*

1914 LISTER, J. J., *St. John's College, Cambridge;* and *Merton House, Grantchester, Cambs.*

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. 1.

1903 LOFTHOUSE, Thomas Ashton, *The Croft, Linthorpe, Middlesbrough.*

1908 LONGSDON, D., *The Flower House, Southend, Catford,* S.E. 6.

1904 † LONGSTAFF, George Blundell, M.A., M.D., VICE-PRESIDENT, (V.-PRES., 1909, 1915; COUNCIL, 1907–9, 1915–), *Highlands, Putney Heath,* S.W. 15.

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., *Pinarro, South Australia.*

1901 LOWER, Rupert S., *Davonport-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.*

1903 LYELL, G., *Gisborne, Victoria, Australia.*

1912 LYLE, George Trevor, *Mayfield, Linsfield-road, Cambridge.*

1909 LYON, Francis Hamilton, 89, *Clarence Gate-gardens, Upper Baker-street,* N.W. 1.

1887 M'DOUGALL, James Thomas, *St. Lawrence, Isle of Wight.*

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.*

1892 Mansbridge, William, 4, *Norwich-road, Wavertree, Liverpool.*

1894 † Marshall, Alick.

1895 Marshall, Guy Anstruther Knox, D.Sc., F.Z.S., (Council, 1907–8), 6, *Chester-place, Hyde Park-square*, W. 2.

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., 15, *Avonmore-road*, W. 14.

1910*†Mason, C. W., *St. Denis, Shaftesbury, Dorset.*

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, 211, *Piccadilly*, W.

1900 Maxwell-Lefroy, H., *Imperial College of Science and Technology, South Kensington*, S.W.

1916 May, Harry Haden, *Blackfriars House, Plymouth.*

1913 Meaden, Louis, *Melbourne, Dyke-road, Preston, Brighton.*

1885 Melvill, James Cosmo, M.A., F.L.S., *Meole Brace Hall, Shrewsbury.*

1907 Melville, Mrs. Catharine Maria, *Redvers, Essa-road, Saltash.*

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.*

1912 Metcalfe, Rev. J. W., *The Vicarage, Ottery St. Mary, Devon.*

1880 Meyrick, Edward, B.A., F.R.S., F.Z.S., *Thornhanger, Marlborough.*

1883 Miles, W. H., c/o E. Step, Esq., 158, *Dora-road, Wimbledon Park*, S.W. 19.

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. 11.

1899 Moore, Harry, 12, *Lower-road, Rotherhithe.*

1916 Moore, Ralph Headley, B.A., *Heathfield, Plymstock, Devon.*

1886 Morgan, A. C. F., F.L.S., 135, *Oakwood-court, Kensington*, W. 14.

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.*
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. 7
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, Capt. John C., M.A., F.Z.S., 4th Wiltshire Regt., *Fort Canning, Singapore,* and *The Hall, Bradford-on-Avon.*
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., Professor of Biology, *St. Xavier's College, Lamington-road, Grant Road Post, 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 H., *Government Station, Kikori, Detta Division Papua.*
1917 Muschamp, Percy A. H., *Charterhouse School, Godalming.*
1909 Musham, John F., 48, *Brook-street, Selby, Yorks.*

1903 Neave, S. A., M.A., B.Sc., F.Z.S., (Council, 1916–), 24, *de Vere-gardens, Kensington,* W. 8.
1901 Nevinson, E. B., *Morland, Cobham, Surrey.*
1907 Newman, Leonard Woods, *Bexley, Kent.*
1913 Newman, Leslie John William, *Bernard-street, Claremont, 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,* E. 4.
1909 Nicholson, Gilbert W., M.A., M.D., (Council, 1913–15), *Oxford and Cambridge Club, Pall Mall,* S.W. 1.
1906 Nix, John Ashburner, *Tilgate, Crawley, Sussex.*
1916 Nohira, Akio, *Tchijoji, Otagigun, Kyoto, Japan.*
1914 Norris, Frederic de la Mare, *The Agricultural Department, Kuala Lumpur, Federated Malay States.*
1915 Northcote, Dr. A. B., *Blenheim House, Monkgate, York.*
1878 Nottidge, Thomas, *Ashford, Kent.*
1895 Nurse, Lt.-Colonel C. G., *Timworth Hall, Bury St. Edmunds.*

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.*
1913 Ormiston, Walter, *Kalupahani, Haldummulle, Ceylon.*

1895 Page, Herbert E., *Bertrose, Gellatly-road, St. Catherine's Park, S.E. 15.*

1916 Palmer, Arthur Raymond, *Ingleholme, Norton Way, Letchworth, Herts.*

1912 Paterson, Edward J., *Fairholme, Crowborough.*

1911 Pearson, Douglas, *Chilwell House, Chilwell, Notts.*

1916 Peebles, Howard M., 13, *Chesham-street*, S.W. 1.

1915 Peile, Major Harry Diamond, I.M.S., c/o *Alliance Bank of Sind, Peshawar, India.*

1914 Pendlebury, Major 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. 2.

1903 † Phillips, Montagu A., F.R.G.S., F.Z.S., *Devonshire House Preparatory School, Reigate.*

1917 Pickard-Cambridge, Arthur D., M.A., *Balliol College, Oxford.*

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. 7.

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.*

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.*

1908 Pratt, William B., 10, *Lion Gate Gardens, Richmond, Surrey.*

1878 Price, David, 48, *West-street, Horsham.*

1908 Prideaux, Robert M., (Council, 1917–), *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,* E. 8.

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., *Hollybrook, Rose Heyworth-road, Abertillery, Monmouthshire.*

1913 Rao, H. Ananthaswamy, *Curator of the Government Museum, Bangalore, India.*

1916 Rao, Yelseti Ramachandra, M.A., Asst. Govt. Entomologist, *Agricultural College, Coimbatore, India.*

1907 Rayward, Arthur Leslie, 91 and 93, *Southwark-street*, S.E. 1.

1898 Reuter, Professor Enzio, *Helsingfors, Finland.*

1910 de Rhé-Philipe, G. W. V., Chief Examiner of Accounts, North-Western Ry., *Abbott-road, Lahore, India.*

1912 Riley, Norman Denbigh, 94, *Drakefield-road, Upper Tooting*, S.W. 17.; and *British Museum (Natural History), S. Kensington*, S.W. 7.

1908 Rippon, Claude, M.A., 28, *Walton-street, Oxford.*

1917 Roberts, A. W. Rymer, M.A., *Rothamsted Experimental Station, Harpenden.*

1905 Robinson, Herbert C., *Curator of State Museum, Kuala Lumpur, Selangor.*

1904 Robinson, Lady, *Worksop Manor, Notts.*

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.*

1912 Rosen, Kurt, Baron, *Zoologische Staatssammlung, Munich.*

1907 Rosenberg, W. F. H., 57, *Haverstock-hill*, N.W. 3.

1868 Rothney, George Alexander James, *Pembury, Tudor-road, Upper Norwood*, S.E.

1888 † Rothschild, The Right Honble. Lord, D.Sc., F.R.S., F.L.S., F.Z.S., (Council, 1900), *Zoological Museum, Tring.*

1894 † Rothschild, The Honble. Nathaniel Charles, M.A., F.L.S., F.Z.S., Vice-President, (Pres., 1915–16; V.-Pres., 1914; Council, 1904, 1913–), *Arundel-house, Kensington Palace Gardens*, W. 8.

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, 1914–16), *Oxhey-grove, Harrow Weald.*

1910 Rudge, Charles Henry.

1892 Russell, S. G. C., *Monk's Wood, Heatherside, Park-road, Woking.*

1905 St. Quintin, W. H., *Scampton Hall, Rillington, York.*

1906 Sampson, Colonel F. Winn, Commandant Prisoners of War (Officers) Camp, *Dyffryn Aled, Llansannan, Abergele, N. Wales*, and 115, *Tannsfield-road, Sydenham.*

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., *Elmswood*, 8, *Malden-road, New Malden.*

1911 Scorer, Alfred George, *Hill Crest, Chilworth, Guildford.*

1909 Scott, Hugh, M.A., F.L.S., Curator in Entomology, *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., *Sleaford, Penn Hill, Parkstone, Dorset.*

1911 † Sennett, Noel Stanton, 24, *de Vere-gardens, Kensington,* W. 8.

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), *The Bungalow, Crowthorne, Berks.*

1915 Shaw, Dr. A. Eland, c/o R. Kelly, Esq., Solicitor, 59, *Swanston-street, Melbourne, Victoria, Australia.*

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. 4.

1911 Simes, James A., *Mon Repos, Monkham's-lane, Woodford-green, Essex.*

1904 Simmonds, Hubert W., 12, *Grey's Chambers, Court House-lane, Auckland, New Zealand.*

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. 1.

1907 Sly, Harold Baker, *Oxford House, East-drive, Brighton.*

1906 Smallman, Raleigh S., *Eliot Lodge, Albemarle-road, Beckenham, Kent.*

1916 Smart, Capt. H. Douglas, R.A.M.C., *Shelley, Huddersfield.*

1915 Smith, Adam Charles, *Horton, Mornington-road, Woodford Green.*

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. 19.

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.W. 2.

1916 Sowerby, Lieut. F. W., R.N.D., *Cleethorpes, Lincolnshire.*

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-road, Weybridge.*

1910 Stenton, Rupert, *St. Edward's, St. Mary Church, Torquay.*

1910 Stoneham, Hugh Frederick, Capt. 1st Batt. E. Surrey Regt., *Stoneleigh, Reigate.*
1913 Storey, Gilbert, *Dept. of Agriculture, Cairo, Egypt.*
1915 Stott, Charles Ernest, *Eaton, Reigate.*
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.*
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), 4, *Gunterstone-road, West Kensington,* W. 14.
1894 Swinhoe, Ernest, 4, *Gunterstone-road, West Kensington,* W. 14.
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., *Mon plaisir, Wormley, Surrey.*
1916 Tatchell, Leonard Spencer, 43, *Spratt Hall-road, Wanstead,* N.E.
1911 Tautz, P. H., *Cranleigh, Pinner, Middlesex.*
1911 Taylor, Frank H., Australian Institute of Tropical Medicine *P.O. Box* 207, *Townsville, Queensland.*
1903 Taylor, Thomas Harold, M.A., *Yorkshire College, Leeds.*
1914 Temperley, Reginald, c/o Dr. W. Griffith, 43, *Park-square, Leeds,* and *L'Aurore, Vevey-la-Tour, Vaud, Switzerland.*
1910 Theobald, Prof. F. V., M.A., *Wye Court, Wye, Kent.*
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., M.A., B.Sc., F.L.S., Linnean Macleay Fellow in Zoology, *Kuranda, Mount Errington, Hornsby, New South Wales.*
1911 Todd, R. G., 54, *Hornsey-lane, Highgate,* N.
1897 Tomlin, J. R. le B., M.A., (Council 1911–3), *Lakefoot, Hamilton-road, Reading.*
1907 Tonge, Alfred Ernest, (Council, 1915–), *Aincroft, Reigate, Surrey.*
1914 de la Torre Bueno, J. R., 25, *Broad-street, New York, U.S.A.*
1907 Tragårdh, Dr. Ivar, *The University, Upsala, Sweden.*
1906 Tulloch, Col. B., *The King's Own Yorkshire Light Infantry,* c/o Messrs. Cox & Co., 16, *Charing Cross,* S.W.
1895 Tunaley, Henry, *Castleton, Searle-road, Farnham.*
1910 Turati, Conte Emilio, 4, *Piazza S. Alessandro, Milan, Italy.*
1898 Turner, A. J., M.D., *The Manor War Hospital, Epsom,* and *Wickham Terrace, Brisbane, Australia.*
1893 Turner, Henry Jerome, (Council, 1910–12), 98, *Drakefell-road, New Cross,* S.E. 14.
1906 Turner, Rowland E., (Council, 1909–10).
1915 Tytler, Col. H. C., c/o Mrs. Tytler, Messrs. Grindlay & Co., *Parliament-street,* S.W. 1.

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, *Natova, Nadi, Fiji Islands.*
1909 Vidler, Leopold A., *The Carmelite Stone House, Rye.*
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, 1912–14), 45, *Handsworth Wood-road, Handsworth, Birmingham.*
1878 Walker, James J., M.A., R.N., F.L.S., Secretary, 1905– (V.-Pres., 1916; Council, 1894; Sec. 1899), *Aorangi, Lonsdale-road, Summertown, Oxford.*
1912 Wallace, Henry S., 6, *Kayll-road Villas, Sunderland.*
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. 7.
1910 Ward, John J., *Rusinurbe House, Somerset-road, Coventry.*
1908 Warren, Brisbane C. S., *Hotel Moy, Oberhofen, Lac de Thoune, Switzerland.*
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., 32, *Blandford-road, Bedford Park*, W. 4.
1914 Watt, Morris N., *St. John's Hill, Wanganui, New Zealand.*
1893 Webb, John Cooper, 89, *Dulwich Villa, Dulwich*, S.E. 22.
1876 † Western, E. Young, 27, *Pembridge-square, Notting Hill Gate*, W. 2.
1906 Wheeler, The Rev. George, M.A., F.Z.S., Secretary, 1911– ; (V.-Pres., 1914), 37, *Gloucester-place*, W. 1.
1910 White, Edward Barton, M.R.C.S., *Cardiff City Mental Hospital, Cardiff.*
1913 † Whitley, Percival N., *Brantwood, Halifax*; and *New College, Oxford.*
1913 † Whittaker, Oscar, *Ormidale, Ashlands, Ashton-upon-Mersey.*
1911 Whittingham, Rev. Canon W. G., *Glaston Rectory, Uppingham.*
1917 Wickham, Rev. Prebendary A. P., *East Brent Vicarage, Highbridge, Somerset.*
1906 Wickwar, Oswin S., *Charlemont, Gregory-road, Colombo, Ceylon.*
1903 Wiggins, Clare A., M.R.C.S., *Entebbe, Uganda.*
1896 Wileman, A. E., *Thatched House Club, St. James'-street*, S.W. 1.
1910 Willcocks, Frank C., Entomologist to the Khedivial Agricultural Society, *Cairo, Egypt.*
1911 Williams, C. B., M.A., *Port of Spain, Trinidad*, and 20, *Slatey-road, Birkenhead.*

1915 Williams, Harold Beck, 131, *Queen's-road, Wimbledon*, S.W. 19.
1915 Winn, Albert F., *Library of McGill University, Westmount, Montreal, Canada.*
1894 Wolley-Dod, F. H., *Millarville P. O., Alberta, N.W.T., Canada.*
1905 Woodbridge, Francis Charles, *Briar Close, Latchmore-avenue, Gerrard's Cross S.O., Bucks.*
1914 Woodforde, Francis Cardew, B.A., 2, *Isis-street, Oxford.*
1912 Woodruffe-Peacock, Rev. E. Adrian, F.L.S., F.G.S., *Cadney Vicarage, Brigg, Lincolnshire.*

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

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[Parasitology, Vol. IX, 1917.] *The Authors.*

Back (E. A.) and Pemberton (C. E.). The Melon Fly in Hawaii (*Bactrocera cucurbitae*, Coq.).
[U. S. Dept. Agric., Bull. No. 491, June 1917.]
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Bacot (A.). The Use of Insecticides against Lice.
[Brit. Med. Journ., Sept. 30, 1916.]

——— A simple means of ascertaining if a sterilising hut is hot enough to destroy lice and nits in clothing and in blankets.
[Brit. Med. Journ., Aug. 4. 1917.]

——— A contribution to the Bionomics of *Pediculus humanus* (*vestimenti*) and *Pediculvs capitis.*
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——— The Louse Problem.
[Proc. Royal Soc. Medicine, Vol. X (Sect. Epidemiology and State Medicine), 1917.] *The Author.*

——— [See Atkin (E. E.).]

Baker (A. C.) and Davidson (W. M.). A further contribution to the study of *Eriosoma pyricola*, the woolly pear Aphis.
[Journ. Agric. Research, Vol. X, July 1917.]
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——— [See Quaintance (A. L.).]

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[Koninkl. Akad. Wet. Amsterdam, Vol. XIX, Nos. 9, 10, 1917.]
The Author.

Bolton (H.). The "Mark Stirrup" collection of Fossil Insects from the Coal Measures of Commentry (Allier), Central France.
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[Proc. U. S. Nat. Mus., Vol. LI, Jan. 1917.]
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[New Zealand Institute, Bull. No. 1, June 1917.]
The Author.

Burgess (A. F.) and Collins (C. W.). The genus *Calosoma*, including studies of seasonal histories, habits, and economic importance of American species north of Mexico and of several introduced species.
[U. S. Dept. Agric., Bull. No. 417, July 1917.]
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BURKE (H. E.). Flat-headed borers (Buprestid larvae) affecting forest trees in the United States.
[U. S. Dept. Agric., Bull. No. 437, Jan. 1917.]
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BUSCK (A.). The pink bollworm, *Pectinophora gossypiella*.
[Journ. Agric. Research, Vol. IX, June 1917.]
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CARPENTER (G. H.). Injurious Insects and other Animals observed in Ireland during the years 1914 and 1915.
[Econ. Proc. Royal Dublin Soc., Vol. II, 1916.]
The Author.

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[Ann. and Mag. Nat. Hist., Ser. 8, Vol. XIX, Feb. 1917.]

——— A remarkable new species of *Scirtes* from Nyasaland.
[Ent. Monthly Mag., Vol. LIII, 1917.]

——— The larva of *Byrrhus pilula*, L.
[Ent. Monthly Mag., Vol. LIII, 1917.]

——— Some Coleoptera from Northern India.
[Ent. Monthly Mag., Vol. LIII, 1917.]

——— A new Barid from a Costa Rican bromeliad.
[Ent. Monthly Mag., Vol. LIII, 1917.]

——— Notes on Tropical American *Lagriidae*, with descriptions of new species.
[Ent. Monthly Mag., Vol. LIII, 1917.]

——— New Xylophilids from Australia, India and Borneo.
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——— Notes on the Coleoptera recorded from "Resin Animé" by the Rev. F. W. Hope, (1), (2).
[Ent. Monthly Mag., Vol. LIII, 1917.]

——— On new and little-known *Lagriidae* from tropical America.
[Trans. Ent. Soc. Lond., 1917.] *The Author.*

CHITTENDEN (F. H.). The horse-radish Flea-beetle (*Phyllotreta armoraciae*, Koch): its life-history and distribution.
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[Agric. Gazette of Canada, Vol. V, Nov. 1917.]
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CLEMENT (G. E.) and MUNRO (W.). Control of the Gipsy Moth by forest management. Part I: The Gipsy Moth in Woods. By G. E. Clement. Part II: Management of typical wood lots infested with the Gipsy Moth in the White-pine region. By Willis Munro.
[U. S. Dept. Agric., Bull. No. 484, April 1917.]
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[Proc. Acad. Nat. Sci. Philad., 1916.]

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[Philippine Journ. Sci., Vol. XI, 1916.]

——— A collection of Bees from Queensland.
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——— The Fauna of Boulder County, Colorado, Insecta, III, IV.
[Univ. Colorado Studies, Vol. XII, No. 1, Jan. 1917.]

——— New Tertiary Insects.
[Proc. U. S. Nat. Mus., Vol. LII, Feb. 1917.]

——— The Dawn of History: a drama in three acts.
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——— Descriptions of Fossil Insects.
[Proc. Biol. Soc. Washington, Vol. XXX, May 1917.]

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——— Some Bees of the genus *Psaenythia* (Hym.).
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[Psyche, Vol. XXIV, No. 2, 1917.] *The Author.*

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[Journ. Board Agric., Vol. XXIV, Aug. 1917.]
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COMBS (A. F.). Notes on a collection of Odonata from Schoolcraft County, Michigan.
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CUMMINGS (B. F.). The Louse and its relation to disease, its life-history and habits, and how to deal with it.
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——— The Bed-bug, its habits and life-history, and how to deal with it.
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——— A revision of Hymenopterous insects of the tribe *Cremastini* of America north of Mexico.
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[Trans. Linn. Soc. Lond., Zool. 2nd Ser., Vol. XVII, 1917.]
By Exchange.

DOGNIN (P.). Hétérocères de l'Amérique du Sud.
[Fasc. XIII, 1917.] *The Author.*

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[Entom. Record, Vol. XXIX, 1917.] *The Author.*

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[Ann. Applied Biology, Vol. III, Jan. 1917.] *Dept. Agric. Entom., Manchester.*

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[Proc. U. S. Nat. Mus., Vol. LII, March 1917.] *The Smithsonian Institution.*

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[Agric. Gazette N. S. W., Misc. Publ., No. 1886, Aug. 2, 1916.]

——— The Tomato and Bean Bug (*Nezara viridula*, Linn.).
[Agric. Gazette N. S. W., Misc. Publ., No. 1894, Sept. 2, 1916.] *The Author.*

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[Dept. Agric. N.S.W., Farmer's Bull., No. 113, June 1917.] *N.S.W. Dept. Agric.*

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[Proc. U. S. Nat. Mus., Vol. LIII, May 1917.] *The Smithsonian Institution.*

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GIBSON (A.). A new species of *Tortrix* of economic importance from Newfoundland (Lepidoptera : Tortricidae).
[Canad. Entomologist, Vol. XLVIII, 1916.] *The Author.*

——— The Entomological Record for 1916.
[Reprinted from 47th Ann. Rept. Ent. Soc., Ontario, 1916.] *Canad. Dept. Agric.*

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[U. S. Dept. Agric., Bull. No. 427, Feb. 1917.] *U. S. Dept. Agric.*

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[Bull. Ent. Research, Vol. VII, Oct. 1916.]

——— Observations on British Coccidae, with descriptions of new species. No. III.
[Ent. Monthly Mag., Vol. LIII, 1917.]

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[Ent. Monthly Mag., Vol. LIII, 1917.]

——— A list of Coccidae affecting various genera of plants.
[Ann. Applied Biology, Vol. IV, Sept. 1917.] *The Author.*

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[Proc. Royal Soc. Edinburgh, Session 1916–17, Vol. XX, Part 2.
The Author.

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[Special Guide No. 7, 1916.] *The Trustees Brit. Mus.*

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[Trans. Cardiff Nat. Soc., Vol. XLIX, 1916.]

——— The Hemiptera of Glamorgan.
[Trans. Cardiff Nat. Soc., Vol. XLIX, 1916.] *The Author.*

HAMPSON (Sir George). The Determination of Generic Types in the Lepidoptera.
[Entom. News, Vol. XXVIII, Dec. 1917.] *The Author.*

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[Canad. Dept. Agric., Entom. Branch, Circular No. 10, 1917.]

——— Report of the Dominion Entomologist for the year ending March 31, 1917.

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[Journ. Board Agric., Vol. XXIII, March 1917.]
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[Amer. Nat., Vol. XLV, Feb. 1911.]

——— The Numerical results of diverse systems of breeding.
[Genetics, Vol. I, Jan. 1916.]

——— Heredity, Variation and the Results of Selection in the uniparental reproduction of *Difflugia corona*.
[Genetics, Vol. I, Sept. 1916.]

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——— Modifying factors and multiple allelomorphs in relation to the results of selection. [Based on the fruit fly *Drosophila*.]
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FOR THE YEAR 1917.

I. *Descriptions of South American* Micro-Lepidoptera. By E. Meyrick, B.A., F.R.S.

[Read December 6th, 1916.]

The following descriptions are from specimens in my own collection. They include some further interesting material from high levels in the Andes (9000–12,000 feet elevation), amongst which are examples of the genera *Phalonia*, *Crocidosema*, *Aristotelia*, and *Phthorimaea.* Altogether six genera and 102 species are described as new.

PHALONIADAE.

Amallectis, n. g.

Palpi rather long, porrected, triangularly rough-scaled. Antennae in ♂ strongly ciliated. Forewings with 2 from towards angle, 3 absent, 8 absent, 11 from middle. Hindwings with 2 from towards angle, 3 and 4 stalked, 5 somewhat approximated, 6 and 7 long-stalked.

Probably a development of *Phalonia.*

Amallectis devincta, n. sp.

♂. 13 mm. Head ochreous-whitish, sides more ochreous. Palpi ochreous-whitish, laterally more ochreous, with a few dark fuscous specks. Thorax ochreous-whitish, shoulders marked with dark fuscous. Abdomen pale greyish, anal tuft whitish. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen obliquely rounded; ochreous-whitish; a dark fuscous spot mixed with brownish-ochreous on base of costa, and another near beyond it; a transverse fascia from middle of costa, costal portion rather narrow, dark fuscous, mixed with ochreous-brownish, lower half formed of grey irroration, dilating to dorsum, where it extends over more than median third, and is marked with dark fuscous; a cloudy grey spot on costa towards $\frac{3}{4}$: cilia ochreous-whitish. Hindwings whitish, with some cloudy grey strigulae in disc and posteriorly; cilia whitish.

PERU, Lima, in August (*Parish*); one specimen.

Phalonia sublimis, n. sp.

♀. 16 mm. Head whitish. Palpi $2\frac{1}{2}$, pale ochreous mixed with ferruginous. Thorax whitish-ochreous tinged with ferruginous. Abdomen greyish. Forewings elongate, rather narrow, posteriorly slightly dilated, costa slightly arched, apex obtuse, termen hardly rounded, oblique; whitish-ochreous, almost wholly suffused with ferruginous except towards costa beyond middle; some minute blackish strigulae scattered along costa; a moderate suffused deep ferruginous fascia slightly before middle parallel to termen, this fascia and dorsal half of wing beyond it minutely speckled with black; several deep ferruginous spots and marks on apical fourth of wing forming a coarse reticulation: cilia whitish-ochreous, suffusedly barred with grey. Hindwings whitish-grey, indistinctly strigulated with grey; cilia grey-whitish.

PERU, Huancayo, 10,650 feet, in July (*Parish*); one specimen.

Phalonia galbanea, n. sp.

♂♀. 11–13 mm. Head and thorax pale brownish-ochreous, face whitish-ochreous. Palpi $2\frac{3}{4}$, ochreous-whitish tinged with brownish. Antennal ciliations of ♂ 1. Abdomen rather dark grey. Forewings elongate, posteriorly slightly dilated, costa slightly arched, apex obtuse, termen rounded, rather oblique; light brownish-ochreous; basal patch slightly darker, undefined, on costal edge often suffused with dark fuscous; a rather narrow ochreous-brown postmedian fascia, obtusely angulated and interrupted above middle, its costal edge sometimes marked with dark fuscous; a more or less indicated ochreous-brown mark, sometimes with dark fuscous scales, on dorsum before tornus; a rather narrow ochreous-brown fascia from $\frac{4}{5}$ of costa to middle of termen, and three or four small indistinct dark fuscous costal strigulae on or near this: cilia pale ochreous, variably spotted with dark fuscous or blackish irroration. Hindwings blackish-grey; cilia pale grey, with darker grey subbasal shade.

British Guiana, Bartica and Mallali, from December to March (*Parish*); Peru, Pacaya, in August (*Mounsey*); eight specimens.

Phalonia scarificata, n. sp.

♂♀. 8–11 mm. Head, palpi, and thorax pale ochreous. Antennal ciliations of ♂ 1. Abdomen grey. Forewings elongate, posteriorly somewhat dilated, costa gently arched, apex obtuse, termen obliquely rounded; 7 to costa; ochreous, more or less silvery-iridescent; some minute scattered strigulae of black irroration along costa; a quadrate deeper spot on costa beyond middle, edged laterally with strigulae of black irroration; some indistinct darker suffusion, with irregular marks of black irroration, in disc beneath this; a more or less developed triangular blotch of black irroration on dorsum before middle, and a small spot towards tornus; an indistinct spot of deeper suffusion above tornus; an indistinct deeper fasciate streak from $\frac{4}{5}$ of costa to middle of termen, its lower portion covered by an irregular patch of scattered black irroration: cilia pale ochreous. Hindwings with 3 and 4 closely approximated or connate; grey, thinly scaled in cell, veins darker; cilia pale grey.

British Guiana, Bartica and Mallali, from December to March (*Parish*); Dutch Guiana, Paramaribo; Brazil, Parana; twenty-six specimens.

Phalonia enclitica, n. sp.

♂. 13–15 mm. Head whitish. Palpi $2\frac{2}{3}$, ochreous-whitish, tinged or sprinkled with brownish. Antennal ciliations nearly 2. Thorax whitish, sometimes tinged with ochreous. Abdomen grey, anal tuft whitish. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen nearly straight, oblique; pale brownish-ochreous, sometimes more or less whitish-tinged; a faint brownish basal patch, edge angulated, its lower portion marked by a more or less indicated darker streak; a moderate brownish post-median fascia angulated and more or less interrupted in disc, partially sprinkled and marked with dark fuscous on edges, lower portion forming a semioval spot; a roundish brown spot on costa at $\frac{4}{5}$, and one or two dark brown strigulae before and beyond it: cilia pale ochreous. Hindwings grey; cilia whitish-grey, with grey subbasal shade.

ECUADOR, Alausi, 9450 feet, in June (*Parish*); five specimens.

Phalonia mordax, n. sp.

♂. 15–17 mm. Head, palpi, and thorax whitish, more or less sprinkled with fuscous and dark fuscous, palpi 3. Antennal ciliations 2. Abdomen whitish-fuscous. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen rounded, oblique; whitish, strewn with pale ochreous strigulae more or less irrorated with fuscous and dark fuscous; markings brownish sprinkled with dark fuscous; three somewhat oblique spots from costa at $\frac{1}{4}$, middle, and $\frac{3}{4}$; three rather irregular oblique fasciate streaks from dorsum, first at $\frac{1}{4}$, reaching half across wing, second from beyond middle, similar but more or less interrupted beneath its apex, third from tornus, more or less obsolete at lower extremity, reaching $\frac{3}{4}$ across wing near termen; some small marginal spots round apex and termen: cilia whitish, mixed or indistinctly barred with fuscous. Hindwings pale grey, strigulated with grey; cilia whitish-grey, with darker subbasal shade.

ARGENTINA, R. Parana; four specimens.

LASIOTHYRIS, n. g.

Antennae in ♂ ciliated. Forewings with 2 from $\frac{4}{5}$, 3 and 4 approximated, 7 to costa, 11 from middle. Hindwings with 3 and 4 connate, 5 hardly approximated, 6 and 7 nearly parallel.

Apparently allied to *Pharmacis*.

Lasiothyris limatula, n. sp.

♂. 9 mm. Head and thorax light ochreous, face whitish-ochreous. (Palpi broken.) Antennal ciliations 1. Abdomen grey, anal tuft grey-whitish. Forewings elongate, costa slightly arched, apex obtuse, termen rounded, oblique; light ochreous; costa marked with some minute indistinct dark fuscous strigulae, and with narrow elongate spots of ferruginous-fuscous suffusion at $\frac{1}{4}$ and middle; dorsal half suffused with ferruginous, more strongly posteriorly, with a few dark fuscous specks, crossed by some silvery-whitish iridescence beyond middle; an oblique ferruginous-ochreous fascia from $\frac{3}{4}$ of costa to middle of termen, preceded and followed by silvery-whitish iridescence: cilia ochreous, towards tips whitish-tinged. Hindwings hyaline with thinly strewn dark grey hairscales, towards termen suffused with grey, veins and terminal edge dark grey; cilia whitish-grey.

Ecuador, Huigra, 4500 feet, in June (*Parish*); one specimen.

Phtheochroa praeposita, n. sp.

♂. 26–30 mm. Head and palpi fuscous. Antennal ciliations $1\frac{1}{2}$. Thorax white. Abdomen light grey. Forewings elongate, posteriorly considerably dilated, costa anteriorly hardly, posteriorly moderately arched, apex obtuse, termen slightly rounded, rather oblique; silvery-white; a rather broad somewhat oblique fuscous median fascia, tending to be partially interrupted above middle, extended along costa as a suffused diminishing band to base, on costa marked with small darker spots or strigulae, in disc with some silvery iridescence and transverse markings of raised silvery scales; about seven dark fuscous dots on dorsal edge; a rather curved transverse fuscous streak mixed with dark fuscous above tornus, and a small spot above upper extremity of this; a triangular fuscous apical patch, partially sprinkled with dark fuscous, extending over nearly $\frac{1}{3}$ of costa and to below middle of termen: cilia grey (imperfect). Hindwings pale grey, coarsely strigulated or marbled with grey; cilia whitish-grey.

Colombia, San Antonio, 5800 feet, in November; two specimens.

TORTRICIDAE.

Capua arrecta, n. sp.

♂. 17 mm. Head and thorax brown, suffusedly irrorated with dark grey. (Palpi broken.) Abdomen grey. Forewings suboblong, costa anteriorly moderately, posteriorly slightly arched, with costal fold reaching nearly to $\frac{1}{4}$, apex obtuse, termen straight, somewhat oblique; ferruginous-brown, irrorated with dark grey; costal fold and about five costal spots suffused with blackish-grey; central fascia and large triangular costal blotch represented by a broad indefinite general blackish-grey suffusion; a tuft of raised scales on fold beneath middle of wing, and numerous scattered raised scales on surface of wing: cilia brownish, basal half spotted or mixed with dark grey. Hindwings grey, towards apex and upper part of termen paler and strigulated with darker; cilia grey-whitish, with subbasal line.

Peru, Lima, in August (*Parish*); two specimens.

Capua illaqueata, n. sp.

♀. 14 mm. Head and thorax whitish-yellow, anterior margin of thorax marked with brown. Palpi yellow-whitish, with two transverse fuscous bars on second joint, and one on base of terminal. Abdomen grey. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen rounded, rather oblique; light brassy-yellow sprinkled with ferruginous, partially suffused with silvery-white on margins of markings; markings lilac-brown, edged with some dark brown scales; a ferruginous-brown spot along base of costa, enclosing two pale yellow strigulae on costa; a small ferruginous spot on base of dorsum; an irregular oblique fascia from $\frac{1}{3}$ of costa to below middle of wing, its extremity dilated and truncate; a triangular blotch on dorsum about $\frac{1}{3}$; a large spot on middle of costa and a smaller one beyond it, connected by a thick bar beneath; a small costal spot beyond this; an irregular fascia from costa before apex to tornus, including a pale yellow strigula on costa, its anterior edge triangularly prominent above middle so as just to touch angle of the subcostal bar and suffused here with ferruginous, its posterior edge connected with termen below middle by a narrow bar; some small silvery-white spots along termen and tornus: cilia pale yellow barred with ferruginous. Hindwings dark grey; cilia greyish with darker subbasal shade.

French Guiana, R. Maroni; one specimen. Allied to *aluminias*.

Pseudatteria fornicata, n. sp.

♀. 30–38 mm. Head white spotted with black. Palpi nearly 6, slender, black, basal joint white, second joint internally white. Thorax black, posterior margin of collar, a mark on each side of back, a dot in middle, and two posterior white. Abdomen black, segmental margins white. Forewings suboblong, moderately broad, costa strongly arched, apex rounded-obtuse, termen rounded, somewhat oblique; orange; dorsal edge ochreous-whitish; a moderate evenly broad ochreous-white border running all round costa and termen, with purple-black markings as follows, viz. a basal bar, eight thick transverse spots crossing it between this and $\frac{4}{5}$ of costa, four marginal spots round apex connected anteriorly by an irregular marking but first or second of these sometimes disconnected, and five semicircular marginal spots on termen, second confluent with an anterior spot so as to form a bar crossing border; in one specimen a dot beneath this bar anteriorly, in the other a small spot above tornal spot: cilia white, barred with purple-black on markings. Hindwings coppery-orange, dorsum narrowly suffused with dark grey; nine small semicircular purple-black marginal spots round apex and termen; cilia whitish, becoming orange towards tornus and dark grey on dorsum, barred with purple-blackish on spots.

COLOMBIA, San Antonio, 5800 feet, in November; two specimens.

Cacoecia chelograpta, n. sp.

♂. 13 mm. Head whitish, sides of crown mixed with crimson-fuscous. Palpi whitish, slightly sprinkled with crimson. Antennal ciliations $\frac{3}{4}$. Thorax pale ochreous, anterior margin suffused with purplish-brown. Abdomen ochreous-orange. Forewings sub-oblong, moderately broad, rather dilated posteriorly, costa anteriorly gently, posteriorly hardly arched, without fold, apex obtuse, termen slightly rounded, nearly vertical; pale glossy yellow-ochreous; an oblique dark reddish-brown streak from middle of costa reaching half across wing, suffused with dark grey except on costa; a small dark brown spot on costa at $\frac{4}{5}$: cilia whitish-ochreous, on upper half of termen suffused with reddish-brown. Hindwings ochreous-orange; cilia light ochreous.

FRENCH GUIANA, R. Maroni; one specimen.

Cacoecia aerobatica, n. sp.

♂. 30 mm. Head blackish-fuscous on crown, face and palpi light greyish-ochreous. Antennal ciliations 1. Thorax light glossy lilac-fuscous, anterior margin blackish-fuscous. Abdomen grey. Forewings elongate, moderate, posteriorly dilated, costa gently arched, without fold, apex obtuse, termen hardly oblique, obtusely bent in middle; rather light purple-fuscous, finely striolated transversely with dark grey, along costa suffused with grey; an irregular transverse white spot in disc at $\frac{2}{3}$; a large balloon-shaped blackish blotch before termen, extending from near costa $\frac{2}{3}$ across wing, partially edged finely with white, especially on upper part anteriorly: cilia purple-brownish (imperfect). Hindwings grey, with some faint darker strigulae posteriorly; cilia grey.

COLOMBIA, San Antonio, 5800 feet, in November; one specimen.

Tortrix lutosulana, Zell.

I think I have correctly identified this as a species of which I have eleven examples taken at Huigra, Ecuador, 4500 feet, in June. If so, it is a true *Tortrix*, very like the North American *peritana*, but Zeller is not strictly correct in stating that the male has no costal fold; the costal edge is slightly rolled over on basal fourth, and the posterior part of this is furnished with rather long projecting scales, but so closely appressed to surface of wing as to be unnoticeable unless lifted.

Tortrix homophyla, n. sp.

♂. 12 mm. Head, palpi, and thorax ochreous. Antennal ciliations 1. Abdomen pale whitish-ochreous. Forewings elongate, posteriorly somewhat dilated, costa gently arched, without fold, apex obtuse-pointed, termen slightly sinuate, rather oblique; whitish-grey-ochreous, strigulated with light grey, with several indistinct grey-yellowish striae; edge of basal patch angulated in middle, marked with blackish in disc but obsolete towards margins; central fascia moderate, oblique, grey, anterior margin straight, marked with blackish scales, posterior irregular and indefinite; costal patch large, semioval, dark grey, sending a well-marked dark grey line to termen below middle, continued a little down it; a dark grey streak along apical part of termen: cilia whitish-grey-ochreous. Hindwings ochreous-grey-whitish, towards apex with a few grey strigulae; cilia ochreous-grey-whitish.

Colombia, La Crumbre, 6600 feet, in May (*Parish*); one specimen. Very similar to preceding, yet easily distinguished by sinuate termen of forewings and whitish hindwings, besides other differences.

Tortrix capnosticha, n. sp.

♂♀. 13–15 mm. Head and thorax pale fuscous. Palpi ochreous-whitish sprinkled with dark fuscous. Antennal ciliations of ♂ 1. Abdomen fuscous. Forewings elongate-oblong, costa anteriorly moderately, posteriorly hardly arched, in ♂ with edge very narrowly rolled over from base to $\frac{1}{3}$ and slightly rough-scaled, apex obtuse, termen straight, rather oblique; pale ochreous irrorated with fuscous; central fascia moderate, oblique, rather dark fuscous, somewhat narrowed upwards, margins nearly straight, sometimes irregularly interrupted above middle; costal patch rather large, irregular-trapezoidal, rather dark fuscous, with an indistinct line running from it to termen below middle: cilia pale ochreous, with line of fuscous irroration. Hindwings whitish, obscurely strigulated with grey towards apex and on termen, vein 2 and lower margin of cell beyond it suffused with grey; cilia whitish.

Peru, Lima, in August (*Parish*); six specimens.

Tortrix lignea, n. sp.

♂♀. 15–18 mm. Head, palpi, and thorax brown. Antennal ciliations of ♂ ½. Abdomen whitish-grey. Forewings suboblong, costa without fold, anteriorly strongly arched, posteriorly slightly sinuate, apex obtuse, termen somewhat bowed, little oblique; brown, somewhat tinged with ferruginous, obscurely strigulated with dark fuscous, especially on margins; basal patch obscurely darker, partially suffused with dark fuscous irroration, especially towards lower half posteriorly, edge angulated in middle; central fascia darker, broad, rather irregular, from before middle of costa to dorsum before tornus, narrower and irregularly mixed with dark fuscous irroration towards costa; costal patch darker, flattened-triangular, whence a thick streak runs to termen below middle; a short darker streak along upper part of termen: cilia whitish-ochreous, with dark brown subbasal shade. Hindwings grey-whitish, strigulated with grey posteriorly; cilia whitish with grey subbasal line.

Ecuador, Huigra (4500 feet), Alausi (9450 feet), in June (*Parish*); six specimens.

Tortrix fissiculata, n. sp.

♂♀. 18–20 mm. Head, palpi, and thorax light brownish closely irrorated with dark fuscous. Antennal ciliations of ♂ 2. Abdomen grey. Forewings elongate, posteriorly dilated, costa moderately arched, without fold, apex obtuse-pointed, termen somewhat sinuate, oblique; brown suffusedly irrorated with grey, with irregular anastomosing dark fuscous transverse striae; the confluence of these forms a narrow somewhat curved fascia about ⅓, a narrow irregular somewhat oblique fascia beyond middle, and a streak from ¾ of costa to tornus, widest on costa: cilia whitish-fuscous, with dark fuscous subbasal line. Hindwings grey-whitish, more or less strigulated with grey; cilia whitish, with grey subbasal line.

Peru, Aqualani, in June; four specimens.

Eulia atalodes, n. sp.

♂. 14 mm. Head and thorax silvery-white, face, palpi, and shoulders dark fuscous. Antennal ciliations 1. Abdomen whitish. Forewings rather elongate, posteriorly dilated, costa slightly arched, straight in median area, apex obtuse, termen slightly rounded, oblique; silvery-white, tinged with pale greenish-yellow; a dark fuscous streak along basal fifth of costa, edged beneath by an undefined spot of pale yellow suffusion; a large dark fuscous triangular blotch extending on costa from $\frac{1}{3}$ to $\frac{4}{5}$, and reaching half across wing; a small dark fuscous spot on costa near apex; some light grey suffusion along median portion of termen: cilia light grey, towards apex and tornus white. Hindwings pale grey, towards base whitish-tinged; cilia whitish, with two pale grey lines.

Colombia, San Antonio, 5800 feet, in November; one specimen.

Eulia melanecta, n. sp.

♀. 19 mm. Head and palpi whitish tinged with fuscous. Thorax whitish, anterior margin infuscated. Abdomen pale grey. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen rounded, oblique; whitish; costa marked with a series of small dark grey spots, and in middle with a moderately large irregular spot; a dark grey patch occupying dorsal half of wing from base to $\frac{2}{3}$, towards base extended to costa, posteriorly with an irregular grey lobe above nearly reaching median costal spot marked with a subtriangular black spot anteriorly and a black dot beyond this; a curved subterminal grey streak, marked with some small black dots in disc; a grey marginal streak round apex and termen, marked with four small irregular black spots on its upper portion: cilia dark grey irrorated with whitish. Hindwings grey-whitish posteriorly marbled with grey; cilia whitish, with grey subbasal line.

Ecuador, Alausi, 9450 feet, in June (*Parish*); one specimen.

Cnephasia setosa, n. sp.

♂. 18 mm. Head and thorax whitish, sides of crown and shoulders mixed with dark fuscous. Antennal ciliations $\frac{3}{4}$. Abdomen grey-whitish. Forewings elongate, costa gently arched, apex obtuse, termen straight, rather oblique; ochreous-whitish, with a few scattered dark fuscous scales posteriorly, and some dots along costa; a subtriangular dark fuscous spot on base of costa, and a smaller one at $\frac{1}{5}$; a quadrate dark fuscous spot on middle of costa, an oblique fascia from dorsum before middle pointed above and reaching more than half across wing, and a curved elongate spot in disc beyond middle, these three all connected by a spot of grey suffusion; an irregular-trapezoidal dark fuscous spot on dorsum at $\frac{3}{4}$, and an irregular bent fascia from costa at $\frac{4}{5}$ directed towards this but only reaching half across wing: cilia whitish (imperfect). Hindwings ochreous-whitish; a brush of very long spreading black hairscales within cell; cilia whitish.

Colombia, San Antonio, 5800 feet, in November; one specimen.

Cnephasia praecipua, n. sp.

♂. 18 mm. Head and thorax whitish. Palpi whitish, basal half sprinkled with dark fuscous. Antennal ciliations $\frac{3}{4}$. Abdomen grey-whitish. Forewings elongate, posteriorly rather dilated, costa gently arched, apex obtuse, termen nearly straight, rather oblique; ochreous-whitish, faintly tinged here and there with pale reddish-ochreous; markings dark fuscous; several dots or strigulae on costa, and a small triangular spot at $\frac{1}{4}$; a quadrate spot on middle of costa, an oblique fascia from dorsum before middle reaching half across wing, and a mark in disc beyond the interval between them; a large acute-triangular spot on dorsum beyond middle; a fascia from $\frac{3}{4}$ of costa to $\frac{4}{5}$ of dorsum, anterior edge with an irregular prominence in middle, posterior edge nearly straight: cilia ochreous-whitish (imperfect). Hindwings ochreous-whitish, irregularly marbled with grey; cilia ochreous-whitish.

Colombia, San Antonio, 5800 feet, in November; one specimen.

Cnephasia dentata, n. sp.

♂♀. 13–14 mm. Head and thorax whitish, shoulders with some dark fuscous scales. Palpi dark fuscous, terminal joint and apex of second whitish. Antennal ciliations of ♂ 1. Abdomen whitish-grey. Forewings elongate, costa moderately arched, apex obtuse, termen slightly rounded, rather oblique; ochreous-whitish, tinged here and there with light brownish; some blackish dots or small strigulae on costa; a dark fuscous spot on base of costa, and a smaller one at $\frac{1}{5}$; an ochreous-grey spot on middle of costa; an ochreous-grey inwardly oblique fascia from costa at $\frac{3}{4}$, reaching $\frac{2}{3}$ across wing, contracted above middle, becoming pale ochreous in disc; a dark fuscous oblique fasciate blotch from dorsum before middle reaching half across wing, its upper extremity denticulate and connected by an irregular streak with a dark fuscous spot on dorsum at $\frac{4}{5}$; some blackish strigulae on upper part of termen: cilia whitish, on upper part of termen suffused with dark grey, on costa barred with dark fuscous. Hindwings grey-whitish, irregularly strigulated with grey; cilia whitish. Forewings beneath suffused with reddish-brown.

Ecuador, Huigra, 4500 feet, in June (*Parish*); two specimens.

Cnephasia incusa, n. sp.

♂. 12 mm. Head and thorax whitish-ochreous tinged with brownish. Palpi rather short, whitish, irrorated with blackish. Antennal ciliations $1\frac{1}{2}$. Abdomen ochreous-grey-whitish. Forewings elongate, costa slightly arched, apex obtuse, termen slightly rounded, oblique; whitish-ochreous; a broad dark grey transverse band, mixed with reddish-brown and blackish, anterior edge running from $\frac{1}{4}$ of costa to beyond middle of dorsum, rather concave, posterior edge from $\frac{5}{6}$ of costa to $\frac{5}{6}$ of dorsum, slightly concave: cilia whitish-ochreous. Hindwings ochreous-whitish, posteriorly irregularly suffused with grey; cilia ochreous-whitish.

Colombia, La Crumbre, 6600 feet, in May (*Parish*); one specimen.

Amorbia helioxantha, n. sp.

♀. 24–26 mm. Head, palpi, and thorax deep purple-ferruginous, palpi $2\frac{1}{2}$. Abdomen orange. Forewings oblong, costa towards base very strongly arched and somewhat roughened with scales, then almost straight, apex obtuse-pointed, termen almost vertical, sinuate below apex, rounded beneath; ferruginous-brown, strigulated with dark grey; markings formed by darker ferruginous-brown suffusion, with purple gloss, very undefined, strewn with dark grey strigulae and some small groups of bluish-grey scales; basal patch hardly defined, edge very oblique; central fascia moderate, very oblique; a triangular apical patch, its edge running from $\frac{3}{5}$ of costa to tornus, somewhat sinuate: cilia ochreous-brown, with ferruginous-brown basal line. Hindwing deep orange; an apical spot of deep ferruginous suffusion, strigulated with dark grey; cilia orange, tips pale, round apex more or less suffused with deep ferruginous; costa somewhat sinuate before prominent origin of cilia.

French Guiana, R. Maroni; eleven specimens. A single ♂ from the same locality is probably the other sex of this species; the costa of forewings is much less strongly arched, with moderately strong fold from base to $\frac{2}{5}$, the hindwings dull light fulvous-ochreous, deeper posteriorly, with similar dark apical spot.

Sparganothis illuminata, n. sp.

♀. 20 mm. Head, palpi, and thorax ferruginous-brownish, palpi 4. Abdomen orange. Forewings oblong, costa anteriorly strongly arched, posteriorly nearly straight, apex obtuse, termen straight, vertical; ferruginous-brown with silvery-iridescent-violet reflections, strewn with transverse anastomosing greyish-ochreous striolae with strigulae of dark fuscous scales adjoining them; two slightly sinuate fine greyish-ochreous lines edged posteriorly with dark fuscous scales, first from $\frac{1}{3}$ of costa to $\frac{3}{5}$ of dorsum, second from $\frac{3}{5}$ of costa to tornus: cilia brownish-ochreous, on termen with deep violet-ferruginous basal line. Hindwings deep orange, towards apex and upper part of termen coppery-tinged; cilia coppery tinged with fuscous.

French Guiana, R. Maroni; one specimen.

Sparganothis subacida, n. sp.

♂. 15 mm.; ♀. 22 mm. Head, palpi, and thorax greyish-ochreous, slightly sprinkled with dark fuscous, palpi in ♂ 3, in ♀ 4. Antennal ciliations of ♂ 1. Abdomen pale greyish-ochreous. Forewings elongate-oblong, costa anteriorly in ♂ strongly arched, slightly bent over and roughened with scales to beyond middle, with more marked subtriangular projection near base, in ♀ very strongly arched, posteriorly nearly straight, apex obtuse, termen slightly sinuate, little oblique; brownish-ochreous, strewn with ferruginous-brown strigulae; some blackish strigulae on costa; in ♀ a ferruginous-brown spot on costa at $\frac{1}{4}$; costal patch elongate-triangular, ferruginous-brown, in ♂ marked with black, in ♀ narrowly produced anteriorly to before middle of costa; a wedge-shaped ferruginous-brown streak along apical part of termen, with some black scales: cilia light brownish-ochreous, on termen with basal half ferruginous-brown. Hindwings light dull fulvous, faintly darker-strigulated, in ♂ rather broadly suffused with grey towards dorsum; cilia whitish-ochreous.

French Guiana, R. Maroni; two specimens.

Peronea sphenobathra, n. sp.

♂. 15 mm. Head and thorax light greyish-ochreous sprinkled with fuscous. Palpi 3, fuscous, somewhat mixed with pale greyish-ochreous. Abdomen grey. Forewings elongate, costa moderately and evenly arched, apex obtuse-pointed, termen slightly rounded, oblique; pale greyish-ochreous suffused with light brownish; a wedge-shaped fuscous and grey blotch extending along basal fifth of costa, reaching at base to dorsum; a dark leaden-grey apical patch irregularly spotted with dark fuscous, its edge running from before middle of costa to tornus, nearly straight; a transverse ridge-tuft on lower half of wing beyond middle, and another above tornus; some small tufts at $\frac{2}{3}$ above middle and towards apex: cilia grey, beneath tornus pale greyish-ochreous. Hindwings with 5 from middle of transverse vein; rather dark grey, lighter towards base; cilia grey.

British Guiana, Bartica, in February (*Parish*); one specimen. Two other examples from the same locality are in all probability the same species, the characteristic tufts being in the same position; in these the forewings are wholly fuscous with slight greenish tinge, sprinkled with dark fuscous, and more or less largely suffused with dark leaden-grey; in one of them there is a cloudy white dot on costa beyond middle.

Peronea cuprata, n. sp.

♀. 13 mm. Head and thorax light greyish, patagia tinged with coppery. Palpi 2, grey irrorated with whitish. Abdomen grey. Forewings elongate, posteriorly dilated, costa anteriorly slightly, posteriorly moderately arched, apex obtuse, termen nearly straight, little oblique; light brownish; a leaden-grey basal patch somewhat sprinkled with blackish, especially on edge towards costa, edge running from $\frac{1}{3}$ of costa to $\frac{2}{5}$ of dorsum, slightly sinuate; a broad terminal patch of deep coppery-brown suffusion, mixed with purplish-grey suffusion, towards apex with a somewhat oblique transverse light greyish streak and some small spots round apical margin, space between these mixed with blackish; small grey tufts at angles of cell: cilia brownish irrorated with grey and grey-whitish. Hindwings with 5 from middle of transverse vein; dark grey; cilia grey, with darker subbasal line.

British Guiana, Bartica, in January (*Parish*); one specimen.

Peronea flexilineana, Walk.

British Guiana, Bartica, in April (*Parish*); ones pecimen. An undoubted example of this widely distributed Indo-Australian species, which has not been previously recorded from America; it is probably attached to some tree or shrub of cultivation.

EUCOSMIDAE.

Spilonota imminens, n. sp.

♂♀. 11–13 mm. Head, palpi, and thorax grey irrorated with whitish. Antennae in ♂ with notch at $\frac{1}{5}$. Abdomen dark grey. Forewings elongate, posteriorly slightly dilated, costa slightly arched, in ♂ with strong fold from base to middle, apex obtuse, termen slightly rounded, rather oblique; varying from light grey to pale brownish-ochreous, more or less irrorated with whitish, with a few blackish scales; some more or less developed oblique dark fuscous strigulae from costa; in ♂ costal half wholly suffused with dark grey from base to $\frac{2}{3}$ or $\frac{3}{4}$: cilia rather dark grey. Hindwings dark grey; cilia grey, with darker subbasal shade.

British Guiana, Mallali, in March (*Parish*); nine specimens.

Spilonota viridans, n. sp.

♂♀. 12–13 mm. Head and palpi grey, pale-speckled. Antennae in ♂ with notch at $\frac{1}{5}$. Thorax grey, sometimes tinged with greenish or partially suffused with dark fuscous. Abdomen dark grey, anal tuft in ♂ grey-whitish. Forewings elongate, posteriorly slightly dilated, costa gently arched, in ♂ with strong fold from base to beyond middle, filled with whitish hairs, apex obtuse, termen slightly rounded, somewhat oblique; grey suffused with dull greenish, with scattered blackish scales and short variable marks; costa with short oblique blackish marks; costal $\frac{2}{5}$ from base to $\frac{2}{3}$ in ♂ more or less wholly suffused with dark fuscous, this area projecting downwards as an obtuse-triangular blotch marked with black crossing fold beneath middle of wing, preceded by a light grey tuft on fold, dorsal area beneath this more or less tinged or suffused with whitish, in ♀ the lower portion and black marks of this area appear as an irregular median interrupted longitudinal band; a black longitudinal median streak from cell to near termen, and some shorter black longitudinal marks above and below this posteriorly; lateral margins of ocellus obscurely indicated with leaden-metallic: cilia grey sprinkled with whitish and obscurely barred with dark fuscous. Hindwings with 3 and 4 stalked; dark grey, basal area subhyaline; cilia grey, with darker basal shade.

British Guiana, Bartica, December to February (*Parish*); twenty-seven specimens.

Crocidosema, Zell.

I had abandoned this genus, which, being originally founded on the single species *plebeiana*, seemed to be unnecessarily separated from *Eucosma* by a structure which could be regarded as specific. As, however, I now describe five other species undoubtedly allied to it and possessing the same distinguishing peculiarity of structure (the erect tuft at the base of hindwings in ♂), it becomes worth while to restore the generic validity of the group, which is evidently characteristic of South America, the wide distribution of *plebeiana* being doubtless due to artificial introduction. The interesting features of the genus would be concealed if merged in the extensive and cosmopolitan *Eucosma*.

Crocidosema roraria, n. sp.

♂♀. 16–18 mm. Head, palpi, and thorax grey. Abdomen in ♂ pale greyish-ochreous, basal half ochreous-whitish speckled with black, in ♀ light grey. Forewings elongate, posteriorly somewhat dilated, costa gently arched, in ♂ with edge shortly folded over at base and large erect tuft of scales beneath it, apex obtuse, termen slightly sinuate in middle, somewhat oblique; pale greyish-ochreous, in ♂ sprinkled with fuscous and on costal half and towards termen rather suffused with fuscous, in ♀ with dorsal half suffused with dark fuscous from near base onwards, posteriorly extending to near costa; costa strigulated with dark fuscous, and on posterior half with pairs of indistinct whitish strigulae, two distinct white strigulae before apex followed by a small dark brown apical spot; in ♀ a quadrate whitish blotch on dorsum beyond middle more or less apparent; ocellus narrow, speckled with whitish, margined laterally by leaden-metallic streaks reaching more than half across wing and above by some more or less developed irregular blackish markings, its apex connected with that of dorsal postmedian blotch by an oblique grey-whitish streak cutting off between them a triangular dark fuscous dorsal blotch, in ♂ less clearly indicated: cilia grey irrorated with whitish and blackish, towards tornus whitish. Hindwings grey-whitish, in ♂ towards dorsum speckled with black, lower margin of cell black, tuft rather short but extending nearly to vein 2, ochreous-whitish, at base black, in ♀ suffused with grey towards termen; cilia whitish, with light grey subbasal line.

Peru, Matucana, 7780 feet, in July (*Parish*); six specimens (1♂, 5♀).

Crocidosema cosmoptila, n. sp.

♂. 17 mm. Head and thorax grey mixed with blackish. (Palpi broken.) Abdomen mostly black (partly defaced), towards apex pale ochreous. Forewings elongate, posteriorly somewhat dilated, costa gently arched, with narrow fold from base to near middle and rough scales beneath it basally, apex obtuse, termen slightly sinuate in middle, somewhat oblique; grey, mixed with whitish and suffused with dull greenish, on costal $\frac{2}{5}$ dark violet-grey; costa blackish, on posterior half with five pairs of whitish strigulae; basal patch suffused with blackish, undefined, cut by an irregular suffused white median streak from base, running into a large trapezoidal median dorsal whitish blotch whose upper portion projects posteriorly so as almost to reach ocellus; ocellus margined laterally by silvery-metallic streaks and limited above by a curved irregular outwardly oblique black streak, internally speckled with white and containing two black dots: cilia grey sprinkled with blackish (imperfect). Hindwings dark grey, paler and thinly scaled in cell, veins dark fuscous; tuft long, grey, posteriorly whitish, projecting downwards over an ochreous-yellow space surrounded with a few scattered black scales; cilia grey.

ARGENTINA, R. Parana, in April; one specimen.

Crocidosema impendens, n. sp.

♂♀. 16–17 mm. Head whity-brownish, crown in ♂ sometimes suffused with dark grey. Palpi whitish. Thorax ochreous-whitish, somewhat strigulated with dark fuscous, or in ♂ anteriorly and dorsally suffused with dark grey. Abdomen whitish-grey. Forewings elongate, posteriorly somewhat dilated, costa gently arched, in ♂ without fold, apex obtuse, termen slightly rounded, faintly sinuate in middle, somewhat oblique; pale brownish-ochreous; in ♂ a basal patch of dark fuscous suffusion extended on costal half almost to apex, on dorsal half reaching to $\frac{2}{5}$ and followed by an ochreous-whitish quadrate dorsal blotch; in ♀ whole wing longitudinally streaked with dark fuscous suffusion on veins, most strongly subdorsally, costal and dorsal edges strigulated with dark fuscous; ocellus laterally margined with indistinct silvery-metallic streaks, containing three or four undefined black dots near posterior edge: cilia whitish-ochreous somewhat mixed with dark fuscous above middle and on base of lower part of termen, on costa and a subtornal spot dark fuscous. Hindwings whitish-grey strigulated with grey; tuft in ♂ large, dense, ochreous-whitish, basally suffused with fuscous; cilia whitish, with grey basal line.

Ecuador, Alausi, 9450 feet, in June (*Parish*); three specimens.

Crocidosema callida, n. sp.

♂. 17 mm. Head and palpi dark grey, collar paler. Thorax greyish-ochreous, anteriorly and centrally suffused with dark purplish-fuscous. Abdomen grey. Forewings elongate, posteriorly rather dilated, costa gently arched, without fold, apex obtuse, termen slightly sinuate in middle, little oblique; fuscous suffused with purplish-grey; basal patch suffused with dark purplish-fuscous, extending on costa to middle and on dorsum to $\frac{2}{5}$, followed by a quadrate whitish dorsal blotch; posterior half of costa with five pairs of oblique whitish strigulae, last more distinct and followed by a small dark fuscous apical spot; ocellus filled with white irroration, margined laterally with silvery-metallic streaks, and limited above by an outwardly oblique curved blackish-fuscous streak: cilia dark grey with rows of whitish points. Hindwings pale grey, veins and termen suffused with darker grey; tuft somewhat shorter and more extended towards dorsum than in *plebeiana*, grey-whitish, towards base suffused with blackish; cilia grey, with dark grey basal line.

Peru, Chosica, 2800 feet, in July (*Parish*); one specimen.

Crocidosema ptiladelpha, n. sp.

♂. 13–14 mm. Head grey, face and palpi whitish. Thorax dark grey. Abdomen grey, anal tuft whitish. Forewings elongate, costa gently arched, without fold but with a tuft of scales near base, apex obtuse, termen sinuate, somewhat oblique; grey, sometimes tinged with whitish-ochreous in disc posteriorly; basal patch dark fuscous, extending on costa to $\frac{1}{3}$ and on dorsum to middle, edge obtusely angulated in middle, costal tuft grey or grey-whitish; a subquadrate whitish blotch on dorsum beyond this, posteriorly suffused; four or five indistinct pairs of whitish strigulae on costa posteriorly, with obscure oblique leaden strigae running from them, a more distinct pair of white strigulae before apex; ocellus whitish, margined laterally with silvery-metallic streaks, enclosing three or four linear black dots, and preceded by some ochreous tinge, with a black subdorsal dash: cilia whitish, speckled with blackish except on tornus. Hindwings grey-whitish, veins and terminal area suffused with grey, anteriorly semihyaline; tuft large, extending to basal portion of dorsum, ochreous-grey-whitish, with a spot of grey suffusion anteriorly; cilia grey-whitish, with faint grey subbasal line.

♀. 14–15 mm. Differs from ♂ as follows: head mostly ochreous; palpi whitish, second joint suffused with grey towards apex; thorax pale ochreous, partially mixed with grey; forewings greyish-ochreous, paler or whitish-tinged anteriorly, sometimes strigulated with fuscous; lower half of basal patch more or less mixed with dark fuscous, remainder obsolete; dorsal whitish blotch obsolete; other markings as in ♂: cilia suffused with pale ochreous.

Ecuador, Huigra, 4500 feet, in June; Peru, Chosica, 2800 feet, and Lima, 500 feet, in July and August (*Parish*); forty-five specimens. The ♂ is easily distinguished from *plebeiana* by the costal tuft, dark thorax and basal patch; but the ♀, which differs much in appearance from the ♂, would sometimes be very similar to obscurely marked forms of that species. I have not, however, yet received *plebeiana* from South America.

Eucosma procellosa, n. sp.

♂♀. 10–11 mm. Head, palpi, and thorax grey, more or less irrorated or suffused with ochreous-grey-whitish, palpi moderate, subascending, shortly rough-scaled. Abdomen pale greyish-ochreous. Forewings elongate, posteriorly slightly dilated, costa slightly arched, in ♂ without fold, apex obtuse, termen slightly sinuate, little oblique; dark fuscous irrorated with whitish; costa on posterior half with five pairs of strigulae of whitish irroration, first and third pairs emitting very oblique blue-leaden strigae, second of these running to termen beneath apex, others with short blue-leaden marks; a very undefined oblique patch of whitish suffusion or strigulation from middle of dorsum reaching half across wing, sometimes little indicated; ocellus margined laterally by erect thick leaden-metallic streaks, and enclosing three black dots: cilia fuscous, with dark fuscous basal line edged by whitish suffusion. Hindwings with 3 and 4 stalked; whitish-grey, veins and a suffused terminal band fuscous; cilia whitish-grey, with darker basal shade.

Peru, Chosica, 2800 feet, and Lima, 500 feet, in July and August (*Parish*); forty-two specimens.

Eucosma evidens, n. sp.

♂♀. 12–15 mm. Head whitish-ochreous, forehead and collar sometimes spotted with fuscous. Palpi porrected, second joint broadly rough-scaled, whitish-ochreous, more or less wholly suffused with fuscous except on a median blotch on upper portion, terminal joint fuscous. Thorax dark fuscous, posterior extremity whitish-ochreous, patagia more or less suffused with whitish-ochreous. Abdomen fuscous. Forewings elongate, posteriorly slightly dilated, costa gently arched, in ♂ without fold, apex obtuse, termen slightly sinuate, little oblique; brown, more or less strigulated with dark fuscous; dorsal area more or less suffused with dark fuscous, with some indistinct whitish transverse strigulation towards base, and a postmedian subquadrate blotch formed of four subconfluent whitish strigae not reaching half across wing; costa dark fuscous obscurely strigulated with whitish suffusion, posteriorly with more distinct paired white strigulae, whence arise violet-leaden oblique strigae, two beyond middle running respectively to anterior margin of ocellus and termen above middle; ocellus margined laterally by thick leaden-metallic streaks reaching more than half across wing and closed above by a curved black streak, internally blackish closely speckled with white: cilia on upper part of termen blackish speckled with whitish, on lower part ochreous-whitish. Hindwings with 3 and 4 stalked; rather dark grey; cilia grey.

British Guiana, Bartica and Mallali, from December to March (*Parish*); Dutch Guiana, Paramaribo; Cuba, Holguin; twenty-two specimens.

Eucosma operta, n. sp.

♂. 11 mm. Head and thorax grey. Palpi whitish, second joint with fuscous median spot and apical band. Abdomen fuscous. Forewings elongate, posteriorly rather dilated, costa gently arched, with moderate fold from base to beyond middle, apex obtuse, termen hardly sinuate, nearly vertical; brownish-grey; basal $\frac{2}{5}$ obscurely strigulated with dark fuscous; a dark brown triangular blotch extending over posterior half of costa, its apex reaching to lower angle of cell, marked with an irregular blackish longitudinal streak across its middle, a blackish longitudinal mark on its margin above ocellus, and on costa with four pairs of indistinct whitish strigulae whence rise faint oblique violet-leaden strigae; ocellus margined laterally by thick silvery-metallic streaks, anterior triangularly dilated upwards to adjoin costal blotch, internally crossed by five fine blackish dashes separated with whitish: cilia rather dark fuscous finely sprinkled with whitish, towards tornus greyish. Hindwings with 3 and 4 stalked; rather dark fuscous, near base thinly scaled; cilia grey, with darker subbasal shade.

British Guiana, Bartica, in December (*Parish*); one specimen.

Eucosma religiosa, n. sp.

♂. 12 mm. Head white, sides of crown crimson-fuscous. Palpi subascending, white, second joint fuscous except rough anterior scales. Thorax white, patagia with a crimson-fuscous bar. Abdomen grey, anal tuft grey-whitish. Forewings elongate, posteriorly dilated, costa gently arched, without fold, apex very obtuse, termen somewhat prominent, slightly rounded; fuscous suffused with dull crimson, mixed with blackish in disc; a broad ochreous-whitish dorsal band occupying nearly half of wing, upper edge very irregular; costal edge blackish with pairs of whitish strigulae, a violet-leaden striga from $\frac{3}{5}$ of costa to termen below apex; ocellus limited beneath and posteriorly by short silvery-metallic streaks not united, containing three short black marks partially surrounded by whitish: cilia whitish, on upper part of termen with reddish-fuscous subbasal line, on tornus spotted with reddish. Hindwings with 3 and 4 connate; rather dark grey; cilia grey, with darker subbasal shade.

British Guiana, Bartica, in January (*Parish*); one specimen.

Eucosma atricapilla, n. sp.

♀. 12 mm. Head, palpi, collar, and shoulders dark fuscous, thorax otherwise ochreous-whitish, palpi ascending, shortly scaled. Abdomen dark grey. Forewings elongate-oblong, costa towards base rather strongly arched, then nearly straight, apex obtuse, termen hardly sinuate, nearly vertical; pale pinkish-ochreous, somewhat suffused with whitish anteriorly, and strigulated with violet-grey; a large rounded-triangular dark fuscous blotch on dorsum slightly before middle, reaching more than half across wing; an oblique ferruginous spot on middle of costa, whence a line of very fine transverse black and white striolation runs to near termen beneath apex, thence downwards to middle of termen, closely followed on subcostal portion by a very fine violet line; costa beyond this with three small deep ferruginous marks separated by white strigulae, and then a wedge-shaped deep ferruginous spot occupying apical portion and cut transversely in middle by a dark leaden mark: cilia pale ochreous, with interrupted violet-grey basal line, round apex dark brown with blackish basal line. Hindwings with 3 and 4 connate; dark grey; cilia grey, tinged with whitish towards tips.

British Guiana, Bartica, in February (*Parish*); one specimen.

Eucosma digna, n. sp.

♂. 11–12 mm. Head, palpi, and thorax fulvous, palpi ascending, shortly scaled. Abdomen dark grey. Forewings elongate, posteriorly somewhat dilated, costa gently arched, without fold, apex obtuse, termen nearly straight, almost vertical; fulvous, irregularly reticulated with rather dark violet-fuscous, costal area on posterior half suffused with deep ferruginous; costa strigulated with blackish, and on posterior $\frac{2}{3}$ with whitish; an irregular blackish line, angulated in middle and suffused with deep ferruginous, from $\frac{1}{3}$ of costa to $\frac{2}{5}$ of dorsum; a slender oblique blackish streak from middle of costa reaching nearly half across wing, somewhat angulated near its extremity, with a fine acute projection from angle posteriorly, followed by two small black marks; a short oblique blue-leaden striga running to termen below apex, finely edged with ochreous-whitish beneath; ocellus limited beneath by a leaden dash and posteriorly by a leaden-metallic streak edged externally with ochreous-white, and enclosing three strong black dots: cilia fulvous, on termen with a leaden line, on tornus spotted with dark grey at base. Hindwings with 3 and 4 connate or short-stalked; dark fuscous; cilia grey, with darker subbasal shade.

British Guiana, Bartica, in December (*Parish*); two specimens.

Eucosma ortygia, n. sp.

♂♀. 17–18 mm. Head, palpi, and thorax whitish-ochreous variably spotted or suffused with reddish-fuscous, palpi ascending, shortly rough-scaled. Abdomen dark grey. Forewings elongate, posteriorly dilated, costa gently arched, without fold, apex obtuse, termen straight, nearly vertical; whitish-ochreous strigulated with reddish-fuscous mixed with dark fuscous, towards costa and posteriorly or sometimes wholly suffused with ochreous-brown; costa strigulated with blackish and posteriorly with whitish; short violet-leaden marks from posterior pairs of whitish strigulae, and a striga from $\frac{2}{3}$ of costa to termen beneath apex; ocellus limited beneath by a dark fuscous dash and posteriorly by a thick leaden-metallic streak edged externally with ochreous-whitish, containing three strong black dots or short dashes: cilia whitish-ochreous with reddish-brown line, broken up on tornus. Hindwings with 3 and 4 connate; dark fuscous; cilia grey, tinged with whitish towards tips, with darker subbasal shade.

British Guiana, Bartica and Mallali, from December to March (*Parish*); eleven specimens. The allied species *transferrana*, Walk. (= *descriptana*, Walk. = *vincentana*, Wals.), *metaspilana*, Walk., and *leucomesana*, Walk., were all received from Bartica in good series.

Eucosma prudens, n. sp.

♂ ♀. 15 mm. Head in ♂ ochreous-whitish somewhat spotted with dark fuscous, in ♀ ochreous spotted or almost wholly suffused with dark fuscous. Palpi subascending, shortly rough-scaled, whitish, second joint suffused with reddish-fuscous except towards apex, base of terminal joint dark fuscous. Thorax whitish more or less mixed or suffused with fuscous, anterior fourth dark fuscous. Abdomen dark grey, anal tuft in ♂ grey-whitish. Forewings elongate, posteriorly dilated, costa gently arched, without fold, apex obtuse, termen somewhat sinuate, vertical; fuscous, sprinkled with dark fuscous and blackish, in ♂ irregularly mixed and suffusedly striated with whitish, dorsal half in ♀ suffusedly striated with violet-leaden-grey; costa marked with pairs of whitish strigulae, and small blackish spots between these; edge of basal patch indicated by an irregular dark fuscous streak, angulated in middle, across fold with a blackish mark edged posteriorly with white; central fascia very irregular, oblique, dark fuscous, suffused, only distinct on costa; four blue-leaden oblique marks from pairs of costal whitish strigulae posteriorly, second running as a striga to termen beneath apex, edged beneath with white posteriorly, others short; termen narrowly fulvous-brown, with a fine oblique white strigula before apex; ocellus limited beneath by a whitish line and posteriorly by a leaden-metallic streak edged externally with white, and enclosing two black dots: cilia whitish, greyish towards tips on termen, with a leaden subbasal line broken on tornus. Hindwings with 3 and 4 connate; dark grey; cilia grey-whitish, with grey subbasal line.

PERU, Lima, in August (*Parish*); three specimens.

Polychrosis arenacea, n. sp.

♂ ♀. 11–13 mm. Head, palpi, and thorax ochreous-whitish or whitish-ochreous. Abdomen grey, anal tuft of ♂ grey-whitish. Forewings elongate, posteriorly somewhat dilated, costa gently arched, apex obtuse, termen nearly straight, rather oblique; pale ochreous or whitish-ochreous; costa with whitish strigulae, more or less sprinkled with blackish between them; dorsal edge with very small blackish strigulae; a more or less developed blotch of darker suffusion about fold indicating angle of basal patch; an oblique rather narrow deeper ochreous or brownish fascia from middle of costa reaching half across wing, and some undefined suffusion towards dorsum beyond middle, seldom forming a distinct transverse blotch; sometimes a patch of blackish irroration on costa beyond this, or an oblique streak of blackish irroration from above middle of disc to dorsum before tornus, or more undefined blackish irroration towards dorsum generally and across wing beyond middle, all very variable and sometimes wholly absent; a deeper ochreous or brownish transverse spot on tornus, and a wedge-shaped upwards-oblique streak from middle of termen, both often very faint; a slender streak of fine blackish transverse striation along termen: cilia whitish or whitish-ochreous, with ochreous subbasal shade. Hindwings grey-whitish, thinly-scaled, veins and termen suffused with grey; cilia whitish, with faint grey subbasal line.

ECUADOR, Duran, low swampy country, in June (*Parish*); twenty-three specimens. Varies remarkably, but easy of recognition.

Polychrosis oxymochla, n. sp.

♂♀. 12–14 mm. Head, palpi, and thorax dark grey. Abdomen pale grey, anal tuft of ♂ grey-whitish. Forewings elongate, posteriorly rather dilated, costa gently arched, apex obtuse, termen almost straight, rather oblique; dark fuscous finely speckled with whitish, variable in development; costa strigulated with blackish-fuscous, with some small spots; basal patch dark grey, edge blackish-fuscous, angulated in middle, often interrupted above angle, sometimes followed by a fascia of grey-whitish suffusion; an oblique rather narrow blackish-fuscous fascia from before middle of costa, reaching more than half across wing, extremity pointed; a quadrate blackish-fuscous blotch on dorsum before middle; a moderate blackish-fuscous fascia from below middle of termen obliquely upwards towards $\frac{3}{4}$ of costa but not reaching it: cilia rather dark fuscous speckled with whitish, with blackish-fuscous subbasal line. Hindwings grey, lighter towards base, veins and termen darker-suffused; cilia pale grey, with dark grey subbasal line.

PERU, Lima, in August (*Parish*); twenty-eight specimens. Varies considerably in distinctness of markings; nearly allied to the preceding, notwithstanding difference of colouring.

Bactra seria, n. sp.

♂. 18–21 mm. Head, palpi, and thorax pale brownish-ochreous, palpi 3. Antennal ciliations $\frac{3}{4}$. Abdomen light grey, anal tuft pale greyish-ochreous. Forewings elongate, rather narrow anteriorly, posteriorly rather dilated, costa slightly arched, apex obtuse-pointed, termen faintly sinuate, rather oblique; whitish-ochreous tinged with brownish, tending to be marked with fine fuscous lines on veins, and fine brownish lines between veins; costa obliquely strigulated with brownish and fuscous; dorsal edge with a series of cloudy dark fuscous dots or marks; some dark fuscous irroration towards lower margin of cell, tending to form dark fuscous lines on veins, with a more or less developed irregular dark fuscous spot at $\frac{1}{4}$, and one or two cloudy dark fuscous marks on end of cell; a more or less developed triangular spot of fuscous suffusion on termen beneath apex: cilia whitish-ochreous suffused with grey, with obscure dark grey bars. Hindwings whitish-grey or light grey, somewhat darker posteriorly; cilia grey-whitish, with grey subbasal line.

PERU, Aqualani; three specimens.

Argyroploce faceta, n. sp.

♂♀. 13–14 mm. Head, palpi, and thorax fuscous-whitish suffusedly spotted or marbled with red-brown. Abdomen dark grey, anal tuft of ♂ grey-whitish. Forewings rather elongate-triangular, costa moderately arched, somewhat bent beyond middle, apex rounded, termen rounded, somewhat oblique; ochreous-whitish to light ochreous-brownish, irregularly strigulated with brown-reddish and leaden-grey; basal patch and central fascia coarsely strigulated with black but very indefinite, on costa suffused with dark red-brown, edge of basal patch irregular, somewhat curved, central fascia broadening downwards, rather oblique; beyond central fascia a very irregular blue-leaden stria; posterior half of costa black with white strigulae, whence rise short blue-leaden marks, and a sinuate blue-leaden striga from $\frac{3}{5}$ of costa running to termen beneath apex, subcostal area round these deep fulvous or ferruginous; beneath this a curved dark red-brown fasciate patch crossed by black lines on veins extending to near termen below middle, its lower extremity followed by a blue-leaden terminal mark; a very fine black terminal line: cilia pale red-brownish, deeper towards base, spotted with leaden-grey. Hindwings with 3 and 4 connate; blackish-grey; cilia grey, with dark grey subbasal shade.

BRITISH GUIANA, Bartica, from January to April (*Parish*); five specimens.

Argyroploce cataphracta, n. sp.

♂♀. 14–15 mm. Head, palpi, and thorax dark fuscous, head tinged with crimson. Abdomen dark grey. Posterior tibiae in ♂

clothed with long dense whitish hairs above. Forewings suboblong, rather broad, costa anteriorly strongly, posteriorly slightly arched, apex rounded, termen rounded, slightly oblique; dark crimson-fuscous; basal patch, lower half of central fascia, and an irregular patch above tornus marbled with dark blue-leaden; a whitish-ochreous elongate-triangular patch extending over posterior half of costa, more ochreous towards costa, anterior side longest, marked with an iridescent-violet-silvery streak dilated downwards, costal edge deep ferruginous with five pairs of oblique white strigulae, a blue-leaden striga running from fourth pair obliquely across apex, apex suffused with deep ferruginous round this; a very fine black terminal line, partly edged with silvery anteriorly: cilia leaden-grey, basal half deep ferruginous except towards tornus. Hindwings with 3 and 4 connate; dark grey; cilia grey, with dark grey basal shade; dorsal edge in ♂ thickened and rather contorted, with long cilia.

British Guiana, Bartica, from December to February (*Parish*); seventeen specimens.

Argyroploce cymotoma, n. sp.

♂♀. 13–14 mm. Head whity-brownish, sides marked with dark red-brown. Palpi whitish, second joint suffused on lower part with grey, on upper part with red-brown marked with black. Thorax whitish mixed with grey and irregularly spotted with dark red-brown, sometimes much suffused with dark fuscous. Abdomen dark grey, anal tuft of ♂ grey-whitish. Forewings elongate, posteriorly dilated, costa moderately arched, apex rounded-obtuse, termen rounded, nearly vertical; red-brownish; basal patch mixed and strigulated with white, spotted with black on its lower portion, suffused with fuscous on dorsum, marked posteriorly on costa with a dark red-brown blotch; beyond this a somewhat angulated fascia of white striation, on costa forming a more conspicuous white blotch, followed on costa by a dark red-brown blotch, narrow on costa and produced posteriorly into a long acute prominence beneath costa, and on dorsum by a triangular brown blotch edged with white; costa posteriorly dark red-brown with pairs of whitish strigulae, with more or less orange suffusion beneath these, and a sinuate blue-leaden striga running from edge of costal blotch to termen beneath apex, edged beneath with whitish posteriorly; ocellus narrow, whitish-speckled, containing three black marks and enclosed laterally by broad erect spots of pale purplish iridescence: cilia red-brownish, on termen darker towards base. Hindwings with

3 and 4 connate, 5 very closely approximated; dark grey; cilia grey, with darker subbasal shade.

British Guiana, Bartica, in January and February (*Parish*); five specimens. Allied to *albimacula*, Wals.

Argyroploce nomaea, n. sp.

♂ ♀. 9–10 mm. Head, palpi, thorax, and abdomen dark leaden-grey. Forewings elongate-triangular, costa gently arched, apex obtuse, termen rounded, little oblique; dark leaden-grey; markings blackish-fuscous; small spots along costa, separated by groups of two or three very fine indistinct whitish strigulae; some scattered marks and strigulae on basal area; an irregular streak from $\frac{1}{4}$ of costa to $\frac{1}{3}$ of dorsum, sharply angulated in disc; central fascia narrow, oblique, nearly straight or slightly curved, in one specimen thicker on lower half; ocellus containing three black dots, and closed above by a rounded-triangular blotch: cilia grey, with dark fuscous subbasal line. Hindwings with 3 and 4 connate; dark fuscous; cilia whitish-grey, with dark fuscous subbasal line.

British Guiana, Bartica, from December to February (*Parish*); six specimens.

Argyroploce cycladica, n. sp.

♂. 12 mm. Head, palpi, and thorax grey, patagia terminating in expansible tufts of broad scales. Abdomen dark grey. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen rounded, nearly vertical; grey, mostly suffused with glossy blue-leaden between the markings; markings blackish-fuscous, finely edged with white laterally and above; some small marks and spots along costa; an irregular subcostal streak from base to $\frac{1}{3}$; a large rounded blotch extending on dorsum from near base to middle, and reaching more than half across wing; a smaller rounded praetornal blotch, not reaching half across wing; an irregular rather thick bisinuate streak from above middle of disc to near termen above middle: cilia grey, on termen with blackish basal line. Hindwings with 3 and 4 connate; dark fuscous; cilia whitish-grey, with dark fuscous subbasal line; dorsum with a short much thickened lobe clothed with scales.

British Guiana, Bartica, in December (*Parish*); one specimen.

Argyroploce platyzona, n. sp.

♂. 16 mm. Head, palpi, and thorax blackish-fuscous. Abdomen dark grey. Forewings suboblong, moderately broad, costa moderately arched, apex obtuse, termen rounded, little oblique; rosy-ochreous, slightly sprinkled with dark fuscous on veins posteriorly; costa with small blackish marks edged with whitish; basal patch blackish-fuscous, edge nearly straight, space between this and central fascia suffused with ochreous-whitish, of even width; central fascia blackish-fuscous, moderate on costa, becoming very broad downwards, anterior edge straight, posterior evenly curved, finely edged with whitish; a fine black whitish-edged streak along upper part of termen, with a strong oblong projection inwards beneath apex; a few leaden-grey strigulae in region of ocellus: cilia dark grey with blackish basal line, with light rosy-ochreous tornal patch. Hindwings with 3 and 4 connate; dark grey; cilia grey, with darker basal line.

French Guiana, R. Maroni; one specimen.

Argyroploce impolita, n. sp.

♂. 24 mm. Head, palpi, and thorax rather dark brownish, tinged with reddish, especially on patagia. Abdomen grey. Forewings rather elongate-triangular, moderate, costa moderately arched, apex obtuse, termen hardly sinuate, little oblique; rather dark brownish marbled with bluish-leaden on basal half; basal patch edged with a suffused dark fuscous streak, obtusely angulated on fold; two pairs of whitish strigulae on costa between this and central fascia, and a blotch of whitish suffusion beneath these; central fascia broad throughout, dark fuscous, oblique, followed on upper portion by orange-ochreous suffusion more extended posteriorly beneath costa, and on tornal area by a patch of whitish suffusion; costa posteriorly dark fuscous, with pairs of indistinct whitish strigulae; apical area ochreous-brownish: cilia fuscous, on tornus mixed with whitish. Hindwings with 3 and 4 connate; grey; cilia grey, towards tips whitish-tinged.

Colombia, San Antonio, 5800 feet, in November; one specimen.

GELECHIADAE.

Anomoxena, n. g.

Head smooth; ocelli absent; tongue developed. Antennae $\frac{3}{5}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, recurved, second joint thickened with whorls of scales roughly projecting beneath or with whorls forming separate acute projecting teeth of scales, terminal joint as long as second or somewhat shorter, slightly thickened with scales, acute. Maxillary palpi minute, filiform, appressed to tongue. Posterior tibiae clothed with rough projecting hairs above and beneath. Forewings with 1*b* furcate, 2 from angle, 2–5 parallel, transverse vein very oblique outwards from 2 to 5, faint between 5 and 6, 6 and 7 stalked, 7 to costa, 8 separate, approximated to 6 at base, 11 from near middle. Hindwings $\frac{3}{5}$, narrow-trapezoidal, apex acute, more or less strongly produced, termen emarginate beneath apex, cilia 4; 2 remote, 3 and 4 nearly parallel, 4 from angle, 4 and 5 somewhat approximated, 6 and 7 approximated at base.

Type *spinigera.* A remarkable genus, differing from the whole of the family in having vein 8 of the forewings separate instead of stalked with 7; the structure is unquestionable, since all the veins are present, and is alike in both species. Nor can there be any question that the genus belongs to this family, and to the most advanced type of it, since the highly characteristic hindwings (similar to those of *Aristotelia*) are found in no other. The genus must be supposed to have arisen from *Aristotelia* or a form of similar structure, and the peculiarity of neuration can be explained by the reduction and eventual absorption of the stalk of 7 and 8 and apparently in this way only. I regard it therefore as a proved instance of a structural change which is certainly rare, and would usually be difficult of demonstration.

Anomoxena spinigera, n. sp.

♂♀. 10 mm. Head ochreous-whitish, crown with a few dark fuscous specks. Palpi white, second joint with eight rather long fine whorl-teeth edged with black above, terminal joint with black rings near base and above middle. Antennae white ringed with black, towards apex with several narrow grey black-dotted bands separated by single white rings. Thorax ochreous-whitish, dorsally finely striated transversely with blackish. Abdomen blackish-grey. Forewings narrowly elongate-lanceolate; pale ochreous irregularly irrorated with blackish; an inwardly oblique slender fascia of blackish suffusion from costa at $\frac{3}{5}$, not or scarcely reaching dorsum; costal area from this to apex fulvous, without dark irroration, with four oblique fine wedge-shaped pale ochreous streaks posteriorly edged with black: cilia grey, round apex whitish with three curved dark grey lines and a straight rather oblique black bar at base. Hindwings dark grey; cilia grey.

Colombia, La Crumbre, 6600 feet, in May (*Parish*); three specimens.

Anomoxena tetraxoa, n. sp.

♂♀. 8 mm. Head and thorax whitish-ochreous with a few dark fuscous specks. Palpi white, second joint with four confused whorls towards apex roughly projecting beneath, irrorated with dark fuscous on these, terminal joint with basal and median rings of dark fuscous irroration. Antennae white ringed with dark grey, towards apex with bands of two dark rings separated by single white rings. Abdomen grey. Forewings narrow-lanceolate; light ochreous irrorated with dark fuscous; a slender irregular inwardly oblique fascia of blackish suffusion from $\frac{2}{3}$ of costa, and undefined blotches at tornus and apex; costal area posteriorly narrowly orange, with four short slender oblique pale greyish-ochreous streaks edged posteriorly with blackish: cilia light grey, round apex speckled with black, with a rather oblique straight black basal line across apex. Hindwings and cilia light grey.

Ecuador, Huigra, 4500 feet, in June (*Parish*); four specimens.

Aristotelia aulonota, n. sp.

♂♀. 7–9 mm. Head and thorax ochreous-white, patagia dark fuscous. Palpi white, basal $\frac{2}{3}$ of second joint dark fuscous. Abdomen grey, apex whitish. Forewings elongate-lanceolate; 7 and 8 out of 6; dark fuscous, slightly pale-freckled except on edge of dorsal streak; a rather broad whitish-ochreous streak along dorsum from base to beyond tornus, posteriorly pointed, upper edge with two or three slight irregular prominences; a small whitish-ochreous spot on costa at $\frac{3}{4}$: cilia fuscous, blackish-sprinkled, towards tornus ochreous-whitish. Hindwings light grey, in ♂ with expansible pencil of long ochreous-whitish hairs from costa near base; cilia grey-whitish.

Ecuador, Duran, low country, in June (*Parish*); three specimens.

Aristotelia plumata, n. sp.

♂♀. 10–11 mm. Head and thorax glossy grey or dark grey. Palpi dark fuscous, very finely lined with white irroration, terminal joint longer than second. Abdomen grey. Forewings elongate, narrow, costa moderately arched, apex pointed, termen extremely obliquely rounded; 6 separate; grey, sprinkled with blackish and tinged here and there with whitish; plical and second discal stigmata moderate, ochreous, edged with black marks above and beneath, first discal small, black, obliquely beyond plical; thick cloudy ferruginous-blackish oblique fasciate bars from costa at $\frac{1}{6}$, $\frac{1}{3}$, middle, and $\frac{2}{3}$, reaching about half across wing, second terminated by plical stigma, third shorter but with a more oblique projection reaching to apex of fourth, both these terminated by second discal stigma, fourth being little oblique; a cloudy darker spot on tornus; an irregular blackish praeapical blotch: cilia light greyish, with two blackish lines. Hindwings grey; cilia light grey; in ♂ with two or three expansible enormously enlarged shuttle-shaped pearly scales ($\frac{1}{3}$ length of wing) from towards base lying along costa above, and a very large elongate chitinous process projecting obliquely from costa near base, beneath black and concave to receive a fine pencil of long hairs, partially covered beneath by a fringe of much enlarged flat pearly prismatic scales, the remainder covered by a fringe of very long scales projecting downwards from beneath costa of forewings on basal $\frac{2}{3}$.

British Guiana, Bartica, in December and January (*Parish*); eight specimens. The curious and exceptionally complex apparatus for protecting the scent-producing hairpencil of the hindwings suggests that the perfume is in this species unusually volatile and precious.

Aristotelia erycina, n. sp.

♂♀. 9–10 mm. Head whitish-ochreous, sometimes sprinkled with fuscous. Palpi ochreous-whitish, second and terminal joints each with two dark fuscous bands. Thorax pale greyish-ochreous sprinkled with dark fuscous. Abdomen whitish-ochreous more or less suffused with grey. Forewings elongate, narrow, costa slightly arched, apex obtuse-pointed, termen extremely obliquely rounded; 6 separate; pale greyish, suffusedly irrorated with dark fuscous, irregularly tinged and spotted with light rose-pink; a very oblique suffused blackish streak across fold about $\frac{1}{5}$, and an oblique blackish streak from costa to plical stigma, space between these and towards dorsum anteriorly sometimes suffused with pale ochreous; stigmata black, rather elongate, plical obliquely before first discal; two or three small pale marks on costa towards apex; a more or less developed longitudinal blackish streak from second discal stigma: cilia pale greyish, with blackish subbasal line round apex interrupted with pale rosy-tinged spots on tornus, and dark grey postmedian shade. Hindwings grey, in ♂ with a streak of very fine blackish-grey striation along submedian groove; cilia light grey. Forewings in ♂ beneath with costal edge slightly reflexed and roughened from near base to $\frac{2}{3}$, with a more or less developed patch of pale ochreous towards this anteriorly, rest of wing suffused with rather dark fuscous. Hindwings in ♂ beneath greyish-ochreous, suffused with rather dark fuscous towards costa posteriorly, and with a streak of very fine blackish striation along submedian groove as above.

Ecuador, Huigra, 4500 feet, in June; Peru, Chosica, 2800 feet, in July (*Parish*); twenty-five specimens.

Aristotelia cytheraea, n. sp.

♂♀. 8–10 mm. Head pale greyish-ochreous. Palpi ochreous-whitish, second and terminal joints each with two dark fuscous bands. Thorax pale greyish-ochreous sprinkled with dark fuscous. Abdomen grey, anal tuft of ♂ whitish-ochreous. Forewings elongate, narrow, costa gently arched, apex obtuse-pointed, termen extremely obliquely rounded; 6 separate; pale greyish-ochreous suffusedly irrorated with dark fuscous, more or less tinged with rosy-crimson, especially posteriorly; stigmata strong, blackish, somewhat elongate, more or less accompanied with spots of yellow-ochreous suffusion beneath and second discal also above, plical obliquely before first discal, an oblique suffused dark fuscous streak from costa to plical; two small pale spots on costa at $\frac{5}{6}$: cilia pale ochreous, with blackish subbasal line interrupted on tornus with pale sometimes rosy-tinged spots and grey postmedian shade, towards tornus greyish-tinged. Hindwings grey; in ♂ with expansible fringe of long grey-whitish hairs from costa near base; cilia light grey. Forewings in ♂ with costal edge on anterior half ochreous-whitish and folded over beneath.

Colombia, Cali, 500 feet, in May (*Parish*); thirty specimens.

Aristotelia cynthia, n. sp.

♂♀. 10–12 mm. Head whitish-ochreous. Palpi whitish, second and terminal joints each with base and two bands irrorated with dark fuscous. Thorax pale ochreous irrorated with dark fuscous. Abdomen grey, anal tuft of ♂ pale ochreous. Forewings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; 6 separate; white irrorated with dark fuscous, dorsal half suffused with grey and partially mixed with ochreous; broad blackish-fuscous oblique bars from costa at $\frac{1}{6}$ and $\frac{1}{3}$ to fold, second margined beneath by a brownish-ochreous mark; a subtriangular dark fuscous blotch on costa beyond middle, terminated beneath by a brownish-ochreous mark; a suffused dark fuscous apical blotch, sometimes connected with preceding in disc but separated from it on costa by a whitish spot: cilia whitish, sometimes with faint rosy or ochreous tinge at base, with two wide sometimes confluent grey shades, on costa wholly dark grey. Hindwings dark slaty-grey, pale in cell; cilia in ♂ whitish-ochreous, in ♀ light greyish; in ♂ on basal half of costa with extremely long expansible cilia. Forewings and hindwings beneath in both sexes blackish-tinged, forewings in ♂ clothed with ochreous hairs in disc.

PERU, Lima, in August (*Parish*); sixteen specimens.

Aristotelia saturnina, n. sp.

♂♀. 11–12 mm. Head, thorax, and abdomen grey. Palpi whitish or sometimes suffused with grey, second with two dark fuscous bands, terminal joint considerably longer than second, suffusedly lined with dark fuscous. Forewings narrowly elongate-lanceolate; 6 separate; rather dark fuscous, sometimes whitish-speckled, dorsal area more or less suffused or marked with ochreous; obscure darker oblique bars from costa at $\frac{1}{6}$ and $\frac{1}{3}$ to fold, marked with black on fold, more or less edged with whitish towards one another; discal stigmata blackish with a suffused brownish-ochreous streak beneath them; a suffused pale brownish-ochreous spot on costa at $\frac{4}{5}$: cilia grey or grey-whitish, with two darker grey lines, towards base sprinkled with blackish or dark fuscous in indistinct bars. Hindwings grey; cilia light grey; in ♂ with basal portion of costa clothed with much longer expansible pale greyish cilia.

PERU, Lima, in August (*Parish*); ten specimens.

Aristotelia perfossa, n. sp.

♂♀. 10–12 mm. Head and thorax ochreous-whitish irrorated with fuscous. Palpi whitish, second and terminal joints each with base, two bands, and tip dark fuscous. Abdomen grey, anal tuft of ♂ whitish-ochreous. Forewings elongate-lanceolate; 6 separate; whitish irrorated with dark grey; oblique bars of blackish suffusion from costa at $\frac{1}{6}$ and $\frac{1}{3}$, just crossing fold, plical stigma forming an elongate black mark on end of second; discal stigmata black, first obliquely beyond plical, second indistinctly edged with ochreous beneath; a suffused white spot on costa at $\frac{4}{5}$; sometimes some indistinct ochreous marking near tornus: cilia whitish, round apex with two dark fuscous lines. Hindwings grey; cilia pale greyish. Hindwings in ♂ beneath with expansible brush of long light ochreous hairs beneath basal portion of costa, and similar hairs clothing dorsum and termen from base to beyond middle of wing.

Ecuador, Huigra, 4500 feet, in June; Peru, Chosica, 2800 feet, and Lima, in July and August (*Parish*); thirty-five specimens.

Aristotelia paphia, n. sp.

♂ ♀. 10–12 mm. Head rosy-whitish, more or less or sometimes wholly suffused with grey. Palpi white, with two bands of second joint, and two bands and anterior edge of terminal joint blackish. Thorax grey, sometimes rosy-tinged, shoulders darker. Abdomen grey, apex yellowish or rosy. Forewings narrowly elongate-lanceolate; 6 separate; rather dark grey, dorsal area more or less mixed suffusedly with light crimson-pink and sometimes with light ochreous; blackish oblique bars from costa at $\frac{1}{6}$ and $\frac{1}{3}$, just crossing fold, first posteriorly and second on both sides more or less distinctly edged with whitish tinged with crimson-pink; a rosy-white mark on middle of costa; discal stigmata black, first sometimes connected with apex of preceding bar, second larger, edged beneath by a light yellow-ochreous spot; a pale rose-pink spot on costa at $\frac{4}{5}$, white on costal edge: cilia whitish-grey, with three dark grey lines, tips whitish. Hindwings grey; cilia light greyish.

Peru, Chosica, 2800 feet, in July (*Parish*); sixteen specimens.

Aristotelia aphiltra, n. sp.

♂ ♀. 10–12 mm. Head fuscous more or less mixed with whitish. Palpi very long and slender, whitish, second and terminal joints each with base and two bands dark fuscous. Thorax fuscous mixed with dark fuscous, somewhat sprinkled with whitish. Abdomen grey, anal tuft whitish. Forewings narrowly elongate-lanceolate; 6 separate; grey sprinkled with dark fuscous and whitish, dorsal area suffused with brownish-ochreous; oblique dark fuscous bars from costa at $\frac{1}{6}$ and $\frac{1}{3}$ to fold, space between these sometimes more mixed with white; a dark fuscous trapezoidal blotch narrowed downwards on costa about $\frac{2}{3}$, edged beneath by a brownish-ochreous spot, beyond this a white spot on costa, produced along margin of blotch, followed by a dark fuscous apical blotch: cilia whitish with two grey shades, on base spotted with dark fuscous irroration. Hindwings grey; cilia pale greyish.

Peru, Matucana, 7780 feet, in July (*Parish*); three specimens. Two other examples (♂♀) from La Crumbre, 6000 feet, Colombia, I consider also identical; the ♂ has the white markings towards apex tinged with rosy. Another ♂ specimen from Alausi, 9450 feet, Ecuador, may probably be the same species, but is in poor condition.

Aristotelia radicata, n. sp.

♂♀. 9–10 mm. Head pale ochreous, more or less sprinkled with fuscous. Palpi whitish, second joint with three, terminal joint with four dark fuscous rings, terminal joint longer than second. Thorax pale ochreous irrorated with dark grey, shoulders with a dark fuscous spot. Abdomen grey, apex pale greyish-ochreous. Forewings elongate-lanceolate; 6 closely approximated to 7; grey irrorated with dark fuscous and sometimes with whitish; a suffused yellow-ochreous gradually attenuated streak along dorsum to near apex; oblique dark fuscous bars from costa at $\frac{1}{6}$ and $\frac{1}{3}$, terminated by blackish marks on fold; a small cloudy whitish mark on middle of costa; discal stigmata blackish, second elongate, edged beneath by an elongate yellow-ochreous spot; a whitish spot on costa at $\frac{4}{5}$, formed of two subconfluent inwardly oblique strigulae, continued by an oblique white line to posterior extremity of preceding ochreous spot; some white marginal dots or scales round apex: cilia whitish-grey, round apex white with two dark grey lines, base sprinkled with blackish. Hindwings grey; cilia pale greyish.

Colombia, Caldas, 4400 feet, in May (*Parish*); eight specimens.

Aristotelia oribatis, n. sp.

♀. 14 mm. Head whitish. Palpi white, second joint with base and two bands brownish-ochreous, terminal joint with base and three bands dark fuscous. Thorax ochreous-whitish, shoulders dark fuscous. Abdomen grey. Forewings elongate-lanceolate; 6 separate; blackish-fuscous; a suffused brownish-ochreous streak along dorsum from base to apex, occupying about $\frac{1}{3}$ of wing, partially confluent with a brownish-ochreous longitudinal streak above it from before middle to $\frac{3}{4}$, which is partially edged with white above; an oblique white bar from costa at $\frac{1}{5}$ almost reaching dorsal streak, and a similar inwardly oblique white bar from costa at $\frac{4}{5}$; a white apical dot: cilia pale greyish, round apex with four dark grey lines, at base sprinkled with blackish, above tornus with an indistinct whitish bar. Hindwings light violet-grey; cilia pale grey.

Peru, Oroya, 12,200 feet, in July (*Parish*); one specimen.

Aristotelia vicana, n. sp.

♂ ♀. 10–11 mm. Head grey-whitish. Palpi whitish, second and terminal joints each with base and two bands dark fuscous. Thorax grey more or less sprinkled with whitish, shoulders dark fuscous. Abdomen grey, apex whitish. Forewings elongate-lanceolate; 6 closely approximated basally to 7; light grey irrorated with dark fuscous; oblique dark fuscous bars from costa at $\frac{1}{6}$ and $\frac{1}{3}$ terminated by black marks on fold, space between these suffused with white; a fascia of irregular white suffusion crossing wing in middle; discal stigmata black, second forming an elongate mark, edged beneath by an elongate yellow-ochreous spot; an inwardly oblique triangular white spot on costa at $\frac{4}{5}$, and a mark on tornus sometimes connected with it; some undefined ochreous marking before tornus and along termen; two or three white marginal dots round apex: cilia pale grey, round apex white with a blackish antemedian line, on termen with basal groups of blackish irroration, on costa dark fuscous, white on costal spot. Hindwings grey; cilia pale grey.

Peru, Lima, in August (*Parish*); seventeen specimens.

Aristotelia ephoria, n. sp.

♂. 9 mm. Head white, slightly sprinkled with grey. Palpi whitish, second and terminal joints each with basal and supramedian dark fuscous bands, terminal joint shorter than second. Thorax whitish irrorated with grey. Abdomen light grey, anal tuft whitish. Forewings elongate-lanceolate; 6 separate; grey sprinkled with whitish and dark fuscous; a very oblique blackish mark on fold near base; an oblique dark fuscous bar from costa at $\frac{1}{3}$, terminated by a blackish mark on fold edged beneath with ochreous; discal stigmata blackish, edged beneath with ochreous, first beyond plical; some blackish scales above tornus and at apex: cilia light grey, round apex sprinkled with blackish. Hindwings light bluish-grey; cilia pale grey.

Peru, Matucana, 7780 feet, in July (*Parish*); one specimen. Distinguished from all the preceding by the short terminal joint and different marking of palpi.

Aristotelia cosmographa, n. sp.

♂ ♀. 11–12 mm. Head and thorax brownish-ochreous. Palpi white, second joint with three and terminal joint with four dark fuscous bands, terminal joint much longer than second. Abdomen grey, apex grey-whitish. Forewings narrowly elongate-lanceolate; 6 separate; brownish-ochreous or deep yellow-ochreous, costal edge suffused with dark fuscous; an oblique interrupted silvery-white streak near base; three white streaks from costa terminated by silvery-metallic subdorsal spots, first from $\frac{1}{4}$, oblique, edged anteriorly with blackish suffusion, second from middle, direct, third from $\frac{4}{5}$, inwardly oblique, second and third connected by a suffused blackish streak in disc, a spot of silvery-white suffusion beneath costa between first and second connected with costa by a white strigula; a white dot on apex, and sometimes two or three on termen: cilia pale greyish, with indistinct blackish median shade and several slender whitish bars. Hindwings slaty-grey; cilia pale grey.

PERU, Chosica, 2800 feet, in July (*Parish*); three specimens.

HAPALOSARIS, n. g.

Head smooth; ocelli absent; tongue developed. Antennae $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi very long, curved, ascending, second joint above in ♂ clothed with long fine expansible hairs, in ♀ with triangularly expanded hair-scales towards apex, beneath smooth-scaled, terminal joint somewhat shorter than second, slender, acute. Maxillary palpi rudimentary. Posterior tibiae clothed with long rough hairs above. Forewings with 1*b* furcate, 2 from very near angle, 3 absent, 4 from angle, 5 approximated, 7 and 8 out of 6, 7 to costa, 11 from middle. Hindwings $\frac{3}{4}$, elongate-trapezoidal, apex acute, termen obliquely bisinuate beneath apex, cilia 3; 2 remote, 3 and 4 almost connate from angle, 5 approximated, 6 obsolete.

Allied to *Compsosaris*, which it closely resembles superficially. Vein 6 of hindwings appears to be truly obsolete (represented by a weak fold parallel to 7), and not coincident with 7.

Hapalosaris petulans, n. sp.

♂♀. 9–11 mm. Head and thorax ochreous-whitish with a few fuscous specks. Palpi whitish, second joint with three rings of dark fuscous irroration, terminal joint with two black rings. Abdomen ochreous-whitish. Forewings elongate-lanceolate; white, irregularly irrorated with fuscous and dark fuscous, more thinly towards dorsum anteriorly; an oblique blackish bar from costa at $\frac{1}{6}$ to fold; blackish spots on costa before middle and at $\frac{2}{3}$; a black subcostal dot at $\frac{1}{4}$; stigmata black, sometimes ringed with white, plical rather obliquely before first discal, an additional dot between second discal and dorsum; a small blackish spot on dorsum before tornus; three blackish dots on costa towards apex, apical area darker-suffused: cilia pale grey, round apex sprinkled with dark fuscous. Hindwings light grey, in ♂ thinly scaled and whitish-tinged anteriorly; cilia grey-whitish, in ♂ whitish-ochreous on lower part of termen and dorsum; in ♂ a long fine pale ochreous-yellowish hairpencil from base of wing lying along abdomen.

Colombia, La Crumbre, 6600 feet, in May; Ecuador, Huigra, 4500 feet, in June; Peru, Chosica, 2800 feet, in July (*Parish*); twenty-six specimens.

Recurvaria xanthotricha, n. sp.

♂ ♀. 8–9 mm. Head ochreous-whitish, sides of crown with some dark fuscous specks. Palpi whitish, second joint with basal half irrorated with dark fuscous and a blackish subapical ring, terminal joint with two black rings. Thorax whitish irrorated with dark fuscous. Abdomen grey, anal tuft of ♂ pale ochreous. Forewings elongate, narrow, costa slightly arched, apex obtuse-pointed, termen slightly sinuate, rather strongly oblique; whitish, irregularly irrorated with grey and dark fuscous; markings suffused, blackish, more or less confused with the dark irroration; a spot on base of costa; a curved oblique series of three spots (costal, plical, dorsal) towards base, followed by a more or less developed narrow white fascia; a subcostal dot at $\frac{1}{4}$, spots on costa at $\frac{2}{5}$ and $\frac{2}{3}$; stigmata represented by cloudy dots, plical slightly beyond first discal; a spot on tornus; sometimes an irregular angulated fine whitish transverse line is traceable beyond this: cilia whitish-grey, sprinkled with dark fuscous or black except towards tornus. Hindwings and cilia pale greyish; costa in ♂ rolled on anterior portion, with long expansible yellow-ochreous hairpencil from base.

Peru, Chosica, 2800 feet, and Lima, in July and August (*Parish*); twenty-four specimens.

Recurvaria thiodes, n. sp.

♂. 10 mm. Head pale yellow. Palpi whitish-yellow, second joint with black subapical ring, terminal joint with base and supramedian band black. Antennae dark grey. Thorax pale yellow, with two minute black marginal dots posteriorly. Abdomen grey-whitish, anal tuft whitish-ochreous. Forewings elongate-lanceolate; pale sulphur-yellow, slightly speckled with fulvous; an elongate black spot along basal sixth of costa; small black semioval spots on costa at $\frac{2}{5}$ and $\frac{2}{3}$; plical and second discal stigmata black; two or three small black dots on costa towards apex; four narrow semioval dark grey marks along termen, with a few black scales: cilia grey, on costa pale yellow. Hindwings light grey; cilia pale greyish.

COLOMBIA, La Crumbre, 6600 feet, in May (*Parish*); one specimen.

Recurvaria aequorea, n. sp.

♂ ♀. 8 mm. Head, palpi, and thorax ochreous-whitish, shoulders suffused with dark fuscous. Abdomen in ♂ grey-whitish, in ♀ grey. Forewings lanceolate; dark fuscous, sprinkled with whitish; a cloudy whitish dorsal streak from base to tornus, speckled with dark fuscous, pointed posteriorly, edge irregular: cilia ochreous-whitish, round apex and upper part of termen irrorated with dark fuscous. Hindwings in ♂ pale slaty-grey, in ♀ grey; cilia ochreous-whitish; in ♂ with ochreous-yellowish expansible hairpencil lying along costa from base to beyond middle.

PERU, Chosica, 2800 feet, and Lima, in July and August (*Parish*); four specimens.

OXYLECHIA, n. g.

Head smooth; ocelli present; tongue developed. Antennae $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi very long, recurved, second joint with short rough tuft beneath and hairs roughly expanded towards apex above, terminal joint longer than second, slender, acute. Maxillary palpi rudimentary. Posterior tibiae clothed with hairs above. Forewings with 1*b* furcate, 2 from near angle, 3 absent, 7 and 8 stalked, 7 to costa, 11 from middle. Hindwings $\frac{3}{4}$, elongate-trapezoidal, apex somewhat produced, acute, termen obliquely bisinuate beneath apex, cilia 4; 2–4 remote, 4 from angle, 5 approximated to 4 at base, 6 and 7 connate.

Oxylechia confirmata, n. sp.

♂. 8 mm. Head white. Palpi white, second joint marked with black towards base, terminal joint with black submedian ring and supramedian band. Thorax white, shoulders dark fuscous. Abdomen grey, segmental margins and anal tuft white. Forewings elongate, very narrow, costa slightly arched, apex pointed, termen very obliquely rounded; white, tinged with ochreous-yellowish in disc, more strongly and sprinkled with fuscous posteriorly; markings dark fuscous, with some black scales on their edges, and margined with clear white; a basal patch, edge running from $\frac{1}{4}$ of costa, straight, oblique; an elongate narrow patch extending along costa from before middle to apex, anteriorly pointed and preceded by a slight blackish strigula, beneath with slight prominences at middle and $\frac{2}{3}$ of wing tipped with black scales probably representing discal stigmata; a small white costal mark intersecting this at $\frac{4}{5}$; narrow elongate brownish spots sprinkled with black on dorsum beyond middle and on tornus; a black apical dot ringed with white: cilia whitish, round apex with two dark fuscous lines. Hindwings whitish-grey; cilia ochreous-whitish.

COLOMBIA, La Crumbre, 6600 feet, in May (*Parish*); one specimen.

THOLEROSTOLA, n. g.

Head smooth; ocelli absent; tongue apparently obsolete. Antennae $\frac{3}{4}$, in ♂ serrulate, simple, basal joint elongate, without pecten. Labial palpi long, recurved, second joint rather thickened and roughened with scales beneath, terminal joint hardly shorter than second, slightly thickened with scales, acute. Maxillary palpi rudimentary. Posterior tibiae clothed with long hairs above. Forewings with 1*b* long-furcate, 2 from towards angle, 4 and 5 stalked, 7 and 8 stalked, 7 to costa, 11 from middle. Hindwings $\frac{4}{5}$, trapezoidal, apex rather produced, acute, termen obtusely emarginate beneath it, cilia 2; 2 from $\frac{2}{3}$ of cell, 3 approximated to 4 at base, 4 and 5 connate or closely approximated from angle, transverse vein mostly obsolete except near lower extremity, 6 obsolete, represented only by a weak fold parallel to 7.

Allied to *Phthorimaea*.

Tholerostola omphalopa, n. sp.

♂♀. 6–7 mm. Head whitish, crown more or less speckled with dark fuscous. Palpi white, with two bands of second joint, and basal and median bands of terminal joint of blackish irroration. Thorax whitish irrorated with dark fuscous. Abdomen light grey, anal tuft of ♂ grey-whitish. Forewings rather broad-lanceolate; whitish irrorated with dark fuscous or blackish; markings formed by denser blackish irroration or suffusion, undefined, viz. a rather oblique bar from costa at $\frac{1}{5}$ to fold, a broad rather oblique fascia before middle, a broad fascia at $\frac{2}{3}$ including an ochreous spot in middle, and an apical blotch: cilia pale grey, round apex suffused with whitish and speckled with blackish. Hindwings grey; in ♂

an expansible pencil of long light greyish-ochreous hairs from costa near base; cilia pale grey.

Ecuador, Duran, low country, in June (*Parish*); nine specimens.

Phthorimaea trichinaspis, n. sp.

♂♀. 9–10 mm. Head and thorax whitish-grey-ochreous, more or less sprinkled with fuscous. Palpi whitish, second joint irrorated with dark fuscous except apex, terminal joint shorter than second, with basal and supramedian bands of dark fuscous or blackish irroration. Abdomen whitish-ochreous, in ♂ with broad median dark fuscous band. Forewings elongate-lanceolate; 6 sometimes out of 7 near base; whitish-grey-ochreous, irregularly irrorated with dark fuscous; stigmata dark fuscous, obscure, plical slightly before first discal: cilia ochreous-grey-whitish, round apex irrorated with dark fuscous. Hindwings and cilia ochreous-whitish; in ♂ beneath with an elongate-oval patch of long black hairscales below cell, covered by a fringe of very long obliquely directed ochreous hairs from lower median vein.

Peru, Lima, in August (*Parish*); five specimens.

Phthorimaea lenta, n. sp.

♂♀. 10–11 mm. Head and thorax ochreous-whitish irrorated with grey. Palpi whitish, second joint irrorated with dark fuscous except apex, terminal joint almost as long as second, with basal and supramedian bands of dark fuscous irroration. Abdomen grey. Forewings elongate-lanceolate; 6 separate; pale grey irrorated with darker, obscurely and irregularly mixed with light ochreous; stigmata blackish, plical beneath first discal: cilia pale grey, somewhat sprinkled with black. Hindwings light bluish-grey; cilia pale greyish-ochreous; in ♂ with long ochreous-grey-whitish expansible hairpencil from base lying along costa.

Peru, Lima, in August (*Parish*); eight specimens.

Phthorimaea perfidiosa, n. sp.

♂. 10 mm. Head and thorax whitish irrorated with grey. Palpi whitish, second joint irrorated with dark fuscous except apex, terminal joint somewhat shorter than second, with basal and supramedian bands of dark fuscous irroration. Abdomen dark grey, anal tuft ochreous-whitish, claspers very long, clothed with ochreous whitish hairs suffused with yellow internally. Forewings elongate, narrow, costa gently arched, apex pointed, termen very obliquely rounded; 6 separate; grey-whitish sprinkled with grey and dark fuscous, more strongly irrorated along costa; plical stigma rather large, blackish: cilia pale greyish, sprinkled with blackish towards base. Hindwings bluish-grey; a strong ochreous-yellowish expansible hairpencil from base lying along costa to beyond middle; cilia pale ochreous-grey.

Colombia, Caldas, 4400 feet, and La Crumbre, 6600 feet, in May (*Parish*); two specimens.

Phthorimaea crustaria, n. sp.

♂♀. 11–12 mm. Head and thorax ochreous-whitish, sometimes sprinkled with grey. Palpi white, second and terminal joints each with basal and supramedian bands of blackish irroration, terminal joint somewhat shorter than second. Abdomen ochreous-whitish, sometimes dorsally greyish. Forewings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; 6 separate; ochreous-whitish, irregularly and variably sprinkled with grey, ochreous, and blackish; small cloudy spots of blackish irroration on costa at base and $\frac{1}{4}$, and a cloudy blackish dot on fold near base; stigmata rather large, black, sometimes ringed with ochreous, plical rather obliquely before first discal; sometimes indications of cloudy dots of blackish irroration on costa posteriorly and termen: cilia ochreous-whitish, on basal half with scattered dark grey and blackish points. Hindwings light slaty-grey; cilia ochreous-whitish, sometimes tinged with grey.

Peru, Lima, in August (*Parish*); fourteen specimens.

Phthorimaea densata, n. sp.

♂♀. 12–14 mm. Head and thorax grey, sometimes sprinkled with whitish. Palpi white, second and terminal joints each with basal and supramedian bands of blackish irroration, terminal joint somewhat shorter than second. Abdomen grey, basal segment sometimes with two small fulvous spots, segments 2 and 3 with fulvous dorsal patches. Forewings elongate-lanceolate; 6 separate; whitish irrorated with dark grey or blackish; several indistinct blackish dots on basal area, an obscure rather oblique darker streak from costa at $\frac{1}{4}$ to plical stigma, sometimes edged with whitish anteriorly, preceded and followed beneath costa by ochreous marks; stigmata moderate or large, black, edged below by ochreous spots and sometimes surrounded by irregular ochreous markings, plical rather obliquely before first discal; indistinct cloudy whitish opposite costal and tornal marks at $\frac{3}{4}$, sometimes united into a slightly angulated shade: cilia light grey, basal half more or less sprinkled with white and black. Hindwings slaty-grey; cilia grey.

PERU, Lima, in August (*Parish*); twenty-seven specimens.

Phthorimaea gregalis, n. sp.

♂♀. 12–13 mm. Head and thorax dark grey, more or less sprinkled with whitish, face sometimes suffused with whitish. Palpi whitish, second and terminal joints each with basal and supramedian bands of blackish irroration, terminal joint somewhat shorter than second. Abdomen dark grey, apex tinged with ochreous. Forewings elongate-lanceolate; 6 separate; dark fuscous, speckled with whitish; sometimes short brownish-ochreous dashes beneath costa at $\frac{1}{6}$ and $\frac{1}{3}$; stigmata small, black, sometimes edged with brownish markings, plical rather obliquely before first discal; sometimes some obscure brownish marking in disc posteriorly: cilia light grey, basal half sprinkled with black. Hindwings slaty-grey; cilia light ochreous-grey.

PERU, Lima, in August (*Parish*); five specimens.

Phthorimaea urosema, n. sp.

♂. 14 mm. Head ochreous-whitish, crown irrorated with grey. Palpi whitish, second joint with two suffused fuscous bands, terminal joint with two dark fuscous bands. Thorax pale greyish-ochreous, mostly suffusedly irrorated with dark grey. Abdomen grey, anal tuft ochreous-whitish with a strong black mark on each side above. Forewings elongate-lanceolate; 6 separate; greyish-ochreous, somewhat sprinkled irregularly with dark grey, costa suffused with dark grey irroration; three or four cloudy blackish-grey dots towards base on dorsal half; an oblique transverse patch of ochreous-whitish suffusion from costa towards base followed on costa by a small blackish spot and in disc by an elongate blotch of blackish suffusion; stigmata blackish, surrounded by irregular ochreous-whitish suffusion, plical obliquely before first discal, a blotch of blackish suffusion in middle of disc lying between and beneath discal stigmata; costa towards apex with three small ochreous-whitish spots interrupting the dark grey irroration: cilia ochreous-grey-whitish, towards base spotted with dark grey irroration. Hindwings slaty-grey; cilia pale greyish-ochreous.

PERU, Matucana, 7780 feet, in July (*Parish*); one specimen.

Phthorimaea melanocampta, n. sp.

♂. 16 mm. Head and thorax pale greyish-ochreous suffused with grey. Palpi whitish, second joint sprinkled with dark fuscous, terminal joint with two blackish bands. Abdomen blackish becoming brown towards base, sides and anal tuft ochreous-whitish. Forewings elongate-lanceolate; 6 separate; light greyish-ochreous, irregularly sprinkled with blackish-grey, costa narrowly suffused with dark grey irroration; several cloudy black dots on basal area; a thick black suffused streak from costa at $\frac{1}{4}$ rather obliquely half across wing, thence abruptly bent and continued through middle of disc to apex, attenuated posteriorly, nearly interrupted by small pale spots representing discal stigmata, and irregularly interrupted near apex: cilia light greyish-ochreous, sprinkled with black towards base. Hindwings pale slaty-grey; cilia light greyish-ochreous.

Peru, Lima, in August (*Parish*); one specimen.

Phthorimaea aquilina, n. sp.

♂♀. 19–22 mm. Head and thorax varying from pale ochreous to grey. Palpi ochreous-whitish, second joint sprinkled with fuscous, terminal joint with basal and supramedian rings of dark fuscous irroration. Abdomen ochreous-whitish, segments tinged with fuscous towards base, two basal segments more or less suffused with yellow-ochreous. Forewings narrowly elongate-lanceolate; 6 separate; varying from pale ochreous, sprinkled with ferruginous (♀) to light fuscous (♂); a thick black (or in ♀ deep ferruginous) rather oblique streak from costa at $\frac{1}{4}$ reaching half across wing, in disc dilated posteriorly, forming base of an undefined cloudy wedge-shaped patch rather darker than ground colour extending along costa to $\frac{3}{4}$; indistinct cloudy spots of darker suffusion in disc at middle and $\frac{3}{4}$; several small obscure cloudy darker spots on costa and termen towards apex: cilia pale greyish-ochreous or whitish-ochreous, sprinkled with fuscous or dark fuscous. Hindwings pale slaty-grey; cilia pale greyish-ochreous or whitish-ochreous.

Peru, Matucana, 7780 feet, and Huancayo, 10,650 feet, in July (*Parish*); four specimens.

Phthorimaea absoluta, n. sp.

♂. 14 mm. Head whitish-grey-ochreous, crown sprinkled with grey. Palpi stout, ochreous-whitish sprinkled with grey, second and terminal joints each with two bands of blackish irroration, second joint with longer rough scales beneath towards apex. Thorax greyish-ochreous irrorated with whitish and dark grey. Abdomen grey, segmental margins and anal tuft ochreous-whitish. Forewings narrowly elongate-lanceolate; 6 separate; greyish-ochreous sprinkled with dark grey and whitish, here and there mixed with brownish, costa suffusedly irrorated with blackish-grey, veins posteriorly obscurely irrorated with dark grey; several obscure blackish dots on basal area; irregular rather oblique transverse bars of blackish suffusion from costa at $\frac{1}{5}$ and $\frac{2}{5}$, reaching half across wing; stigmata blackish, plical obliquely before first discal; costal irroration towards apex interrupted by three or four small pale spots: cilia light ochreous-greyish, on basal half mixed with ochreous-whitish and sprinkled with fuscous and black. Hindwings light slaty-grey; cilia light ochreous-grey.

PERU, Huancayo, 10,650 feet, in July (*Parish*); one specimen. Much like *urosema*, but readily distinguished by absence of the characteristic black marks on anal tuft.

Phthorimaea loquax, n. sp.

♂♀. 9–10 mm. Head and thorax grey, sometimes partially tinged with ochreous, face sometimes whitish. Palpi fuscous sprinkled with whitish, second and terminal joints each with basal and supramedian bands of blackish irroration, terminal joint somewhat shorter than second. Abdomen in ♂ dark grey, in ♀ whitish-grey. Forewings elongate-lanceolate; 6 separate; dark grey sprinkled with whitish, tinged here and there with ochreous; a black dot beneath costa near base, and two or three other indistinct ones on basal area; a small black costal spot before $\frac{1}{3}$; sometimes ochreous subcostal dashes before and beyond this; stigmata moderate or large, ochreous-brownish, sometimes accompanied by a few blackish scales, plical slightly before first discal; a blackish dot on fold beneath middle of wing; a small cloudy darker spot on costa at $\frac{2}{3}$; a cloudy darker dot above tornus; a cloudy spot of dark fuscous suffusion on termen above tornus; an elongate blackish mark in disc near apex: cilia light grey, basal half sprinkled with whitish and dark grey. Hindwings slaty-grey; cilia pale ochreous-greyish, in ♂ longer and darker towards basal portion of costa.

PERU, Chosica, 2800 feet, in July (*Parish*); thirteen specimens.

Phthorimaea atrifascis, n. sp.

♂♀. 9–10 mm. Head ochreous-whitish irrorated with grey. Palpi grey, sprinkled with whitish, second and terminal joints each with basal and supramedian bands of blackish irroration, terminal joint nearly as long as second. Thorax grey sprinkled with whitish. Abdomen whitish-grey. Posterior tibiae in ♂ with very long whitish-ochreous hairs. Forewings elongate-lanceolate; 6 separate; dark grey irrorated with white; a blackish dot beneath costa near base; an oblique blackish bar from costa at $\frac{1}{4}$ to fold; discal stigmata blackish, indistinctly edged with ochreous beneath, plical ochreous, slightly before first discal; indistinct whitish opposite marks on costa at $\frac{3}{4}$ and tornus: cilia whitish-grey, irrorated with dark grey and black round apex and towards base generally. Hindwings pale slaty-grey; in ♂ a very long dense black expansible hairpencil lying along costa from base to $\frac{2}{3}$; cilia whitish-grey.

PERU, Chosica, 2800 feet, in July (*Parish*); two specimens.

Phthorimaea altisona, n. sp.

♂. 11–12 mm. Head and thorax dark fuscous, slightly whitish-sprinkled. Palpi dark grey sprinkled with blackish and slightly with whitish. Abdomen dark grey. Forewings elongate-lanceolate; 6 separate; dark fuscous, slightly whitish-sprinkled, dorsal area tinged with ochreous-brown; stigmata cloudy, black, plical obliquely before first discal; in one specimen some ochreous-brown streaking towards costa posteriorly; apical area suffused with blackish: cilia grey, round apex mixed with dark fuscous and somewhat sprinkled with whitish. Hindwings bluish-grey; cilia light grey.

PERU, Huancayo, 10,650 feet, in July (*Parish*); two specimens.

Phthorimaea exacta, n. sp.

♂♀. 11–12 mm. Head whitish, sprinkled with dark grey. Palpi white sprinkled with grey, second joint blackish except towards apex, terminal joint nearly as long as second, with black basal ring and supramedian band. Thorax whitish irrorated with dark grey. Abdomen grey, anal tuft in ♂ ochreous-whitish. Forewings elongate, narrow, costa gently arched, apex pointed, termen extremely obliquely rounded; 6 separate; whitish irrorated with grey and dark fuscous; a small blackish spot beneath costa near base; a suffused dark fuscous bar from dorsum at $\frac{1}{3}$ to above middle; blackish spots on costa at $\frac{1}{3}$ and before $\frac{3}{4}$, stigmata cloudy, black, plical beneath first discal, second discal elongate; blotches of darker suffusion on tornus and at apex: cilia pale grey mixed with dark fuscous. Hindwings grey, darker posteriorly; cilia light grey.

BRITISH GUIANA, Bartica, in January and February (*Parish*); two specimens.

Phthorimaea epitricha, n. sp.

♂♀. 8–10 mm. Head whitish, more or less sprinkled with grey. Palpi whitish, second joint irrorated with dark fuscous except apex, terminal joint as long as second, with subbasal and supramedian bands of dark fuscous irroration. Thorax whitish more or less irrorated with dark grey. Abdomen grey, in ♂ with raised lateral subapical tufts of long grey hairs. Forewings elongate, rather narrow, costa gently arched, apex pointed, termen very obliquely rounded; 6 separate; grey-whitish irrorated with dark fuscous; a blackish spot or short oblique bar from costa near base; a small ochreous spot on fold at $\frac{1}{5}$, sometimes edged above and beneath with small blackish spots; a thick oblique blackish streak from $\frac{1}{3}$ of costa to fold; stigmata ochreous, more or less edged above and beneath with small blackish spots, plical obliquely before first discal, an elongate cloudy blackish spot on costa just above second discal, sometimes edged beneath by another ochreous dot; undefined spots of blackish suffusion on tornus and at apex: cilia pale grey sprinkled with black. Hindwings grey, subhyaline in disc anteriorly and towards dorsum; cilia light grey.

British Guiana, Bartica, from December to February (*Parish*); ten specimens.

Phthorimaea involuta, n. sp.

♂♀. 9–11 mm. Head whitish sprinkled with grey. Palpi whitish, second and terminal joints each with subbasal and supramedian bands of dark fuscous irroration, terminal joint as long as second. Thorax whitish irrorated with dark fuscous, patagia sometimes suffused with ochreous. Abdomen dark grey. Forewings elongate, narrow, costa gently arched, apex pointed, termen very obliquely rounded; 6 separate; grey-whitish or whitish-grey, irrorated with black; a narrow oblique blackish bar from costa near base and broader one at $\frac{1}{3}$, both terminated by small yellow-ochreous spots on fold edged beneath by black marks, second spot representing plical stigma; discal stigmata yellow-ochreous, edged above and below by black spots, first obliquely beyond plical stigma, its margin separated by an ochreous mark from a small blackish spot on costa above it, margin of second usually absorbed in a subquadrate blackish blotch on costa above it, its lower margin sometimes forming a considerable spot; a well-defined blackish apical blotch: cilia grey, irrorated with black except towards tips. Hindwings dark grey, subhyaline in disc anteriorly and towards dorsum; cilia rather dark grey.

British Guiana, Mallali, in March (*Parish*); six specimens. Nearly allied to *epitricha*, but forewings rather narrower, yellowish markings clearer and larger, black markings also larger and better defined, hindwings darker, abdomen in ♂ without praeapical tufts of hair.

Stegasta zygotoma, n. sp.

♂♀. 9–11 mm. Head white, often irrorated with dark grey. Palpi white, second joint with ill-defined basal and subapical bands of dark fuscous irroration, terminal joints with two blackish bands. Thorax dark fuscous, slightly whitish-sprinkled, with small ochreous-white posterior spot. Abdomen grey. Forewings elongate, narrow, costa gently arched, apex pointed, termen very obliquely rounded; dark fuscous, sometimes suffused with deep ferruginous-bronze, slightly whitish-sprinkled; two connected ochreous-white triangular blotches occupying dorsum from near base to near tornus, sometimes much suffused with grey irroration, especially dorsally, first narrowly reaching costa at $\frac{1}{5}$, second reaching nearly half across wing, its apex connected with an indistinct whitish dot on middle of costa by a faint grey or grey-whitish cloud in which is a more or less strongly expressed blackish dot (first discal stigma); second discal stigma close beyond this, blackish, sometimes edged below with white or yellowish, or obsolete; a slightly inwards-oblique transverse white spot on costa at $\frac{3}{4}$, tending to connect with a leaden-grey spot on tornus; apical area sometimes irrorated with grey-whitish: cilia whitish, with two indistinct lines of blackish irroration. Hindwings grey or light grey, darker posteriorly; cilia grey or grey-whitish. Forewings in ♂ beneath with an expansible pencil of long whitish hairs from beneath base of costa, covered by fringe of projecting scales.

Colombia, Cali, 500 feet, and La Crumbre, 6600 feet, in May; Ecuador, Huigra, 4500 feet, in June; Peru, Lima, and Chosica, 2800 feet, in August (*Parish*); forty-four specimens. The Peruvian examples have the white markings always much more suffused with grey, whilst in the others they are nearly clear ochreous-white, but I can find no reliable distinction between them otherwise.

Gelechia lacticoma, n. sp.

♂. 10–11 mm. Head and thorax ochreous-whitish, shoulders with a suffused dark fuscous spot. Palpi whitish, basal third of second joint dark fuscous, terminal joint as long as second, with blackish subapical band. Abdomen grey, anal tuft ochreous-whitish. Forewings elongate, narrow, costa gently arched, apex tolerably pointed, termen very obliquely rounded; ochreous-whitish or yellow-whitish; markings fuscous, towards costa irrorated with blackish; an oblique wedge-shaped spot from base of costa to fold; a v-shaped marking from costa before middle, its apex reaching fold, marked with black plical and first discal stigmata, latter obliquely posterior; an irregular fascia from $\frac{3}{4}$ of costa to dorsum before tornus, second discal stigma forming a black mark on its anterior margin; some more or less indicated blackish irroration towards apex: cilia ochreous-whitish, slightly sprinkled with black. Hindwings light grey; cilia ochreous-whitish.

Peru, Chosica, 2800 feet, in July (*Parish*); three specimens.

Gelechia litigiosa, n. sp.

♂♀. 11–13 mm. Head and thorax pale pinkish-fuscous or whitish-fuscous, mixed with dark fuscous. Palpi fuscous-whitish irrorated with dark fuscous, on terminal joint sometimes forming two dark bands. Abdomen grey. Forewings elongate, narrow, costa gently arched, apex obtuse-pointed, termen very obliquely rounded; dark fuscous, variably irrorated (sometimes very slightly) with whitish-fuscous or whitish-ochreous; stigmata cloudy, blackish, plical slightly before first discal; a small cloudy pale ochreous or whitish-ochreous spot on costa at $\frac{3}{4}$: cilia grey, somewhat mixed with dark fuscous. Hindwings and cilia grey.

Ecuador, Huigra, 4500 feet, in June (*Parish*); thirteen specimens.

Gelechia dryobathra, n. sp.

♂. 13–14 mm. Head fuscous, face paler. Palpi pale greyish-ochreous irrorated with dark fuscous, terminal joint somewhat shorter than second. Thorax brown or fuscous. Abdomen grey. Forewings elongate, narrow, costa gently arched, faintly sinuate in middle, apex obtuse, termen very obliquely rounded; dark fuscous, in one specimen streaked with brownish in disc posteriorly; a brown basal patch occupying about $\frac{1}{4}$ of wing, edge irregularly curved or bent; stigmata blackish, approximated, plical somewhat obliquely before first discal; a small pale brownish spot on costa at $\frac{3}{4}$: cilia pale greyish-ochreous, with two lines of blackish irroration, at base fuscous, on costa wholly fuscous. Hindwings grey; cilia light greyish-ochreous.

Colombia, La Crumbre, 6600 feet, in May (*Parish*); two specimens.

Gelechia eburata, n. sp.

♂♀. 14–15 mm. Head ochreous-white. Palpi white, base of second joint black, terminal joint as long as second, apical $\frac{2}{3}$ black except extreme tip. Thorax dark ashy-fuscous, with broad ochreous-white dorsal stripe. Abdomen dark grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse-pointed, termen rounded, rather strongly oblique; dark ashy-fuscous; stigmata black, obscure, plical rather obliquely before first discal; a small cloudy white dot on costa at $\frac{3}{4}$; sometimes one or two white scales on upper part of termen : cilia dark grey. Hindwings dark grey; cilia grey.

Colombia, La Crumbre, 6600 feet, in May (*Parish*); five specimens.

Gelechia consona, n. sp.

♀. 13 mm. Head ochreous-white. Palpi white, base of second joint blackish, terminal joint nearly as long as second, anterior edge blackish on apical half. Thorax ochreous-white, patagia dark purplish-fuscous. Abdomen grey. Forewings elongate, narrow, costa gently arched, apex pointed, termen very obliquely rounded; dark purplish-fuscous; a thick white streak along dorsum from base to $\frac{3}{4}$, irregularly terminated and uniting with a roundish white spot in disc beyond middle of wing; a roundish white spot on costa at $\frac{3}{4}$: cilia grey mixed with blackish. Hindwings grey; cilia light grey.

Peru, Lima, in August (*Parish*); one specimen. Allied to the North American *unifasciella.*

Gelechia argosema, n. sp.

♂♀. 9–11 mm. Head ochreous-white. Palpi ochreous-white, basal third of second joint blackish, terminal joint as long as second, apical $\frac{2}{3}$ blackish except extreme tip. Thorax ochreous-white, patagia dark purplish-fuscous. Abdomen grey. Forewings elongate, rather narrow, costa gently arched, apex obtuse-pointed, termen very obliquely rounded; dark purplish-fuscous; a subtriangular transverse ochreous-white spot from dorsum before tornus, reaching half across wing, and a smaller spot from costa at $\frac{3}{4}$: cilia grey suffused with dark purple-fuscous. Hindwings grey; cilia light grey.

Ecuador, Huigra, 4500 feet, in June (*Parish*); five specimens.

Gelechia pentadora, n. sp.

♂♀. 12–14 mm. Head ochreous-white. Palpi yellow-whitish, second joint with base dark fuscous, terminal joint as long as second, with subapical band and sometimes base blackish. Thorax dark purple-fuscous, with yellow posterior spot. Abdomen dark grey. Forewings elongate, narrow, costa gently arched, apex tolerably pointed, termen very obliquely rounded; dark purple-fuscous; markings yellow; a slightly oblique oval transverse blotch from costa at $\frac{1}{4}$ reaching $\frac{3}{4}$ across wing; a spot beneath middle of disc; an irregular inwardly oblique transverse blotch from costa at $\frac{2}{3}$, reaching more than half across wing; a spot on tornus; a small spot before apex: cilia dark purple-fuscous. Hindwings and cilia dark grey.

French Guiana, R. Maroni; three specimens.

Polyhymno gladiata, n. sp.

♂. 9 mm. Head, palpi, and thorax white (partially defaced), shoulders dark fuscous. Abdomen grey, anal tuft ochreous-whitish. Forewings elongate, rather narrow, costa slightly arched, apex pointed, prominent, termen sinuate, oblique; costal half dark fuscous, dorsal area silvery-grey-whitish, these separated by a broad median longitudinal shining white streak from base to $\frac{5}{6}$, pointed posteriorly, lower edge suffused; a very fine white line along costa from near base to middle, thence diverted as a slender very oblique streak to just above apex of median streak; an oblique white strigula from costa about $\frac{3}{4}$, whence a rather thick angulated leaden-metallic line runs to tornus; beyond this a small white costal strigula, followed by a small white triangular spot; apical and terminal areas round these markings brownish-ochreous: cilia pale grey, above apex with two white wedge-shaped marks separated with dark fuscous, on termen white towards base, with a very short black subbasal mark beneath apex and two black subbasal dots below middle. Hindwings and cilia light grey.

Colombia, Cali, 500 feet, in May (*Parish*); one specimen.

Polyhymno conflicta, n. sp.

♂♀. 10–13 mm. Head whitish. Palpi whitish, second joint fuscous except apex, scales roughly projecting beneath towards apex, terminal joint fuscous anteriorly. Thorax fuscous-whitish. Abdomen whitish-fuscous, anal tuft fuscous-whitish. Forewings elongate, narrow, costa slightly arched, apex produced, acute, termen sinuate, oblique; dark fuscous, with cloudy white or whitish markings, viz. a subcostal line on basal half, a supramedian line to $\frac{5}{8}$, where it meets an attenuated streak from beneath middle of disc, and a confused and irregular more or less confluent suffusion occupying most of dorsal area up to fold; a very oblique white line from middle of costa to near termen above middle; a white oblique strigula from costa at $\frac{3}{4}$, whence a fine acutely angulated leaden-metallic line runs to tornus; two white wedge-shaped marks from costa beyond this; apical area tinged with ochreous: cilia light grey, above apex with two white triangular marks separated with dark fuscous, at apex with a projecting dark fuscous hook, beneath apex white towards base, with a very short black subbasal mark beneath apex and dot below middle. Hindwings light slaty-grey; cilia pale greyish.

PERU, Chosica, 2800 feet, and Lima, in July and August (*Parish*); twenty-seven specimens.

II. *New Species of* Hymenoptera *in the British Museum.* By Rowland E. Turner, F.Z.S., F.E.S.

[Read December 6th, 1916.]

Family BETHYLIDAE.

Genus Dicrogenium, Stadelm.

Dicrogenium, Stadelm., Entom. Nachricht, xx. p. 201, 1894.

Nomineia, Kieff., Ann. Soc. Ent. France, lxxx, p. 453, 1911.

I consider that these are identical, and that Ashmead's action in transferring the genus from the *Bethylidae* to his *Cosilidae* was entirely unjustifiable.

Dicrogenium maximum, sp. n.

♂. Niger; mandibulis apice fusco-ferrugineis; alis fuscis, apice fusco-hyalinis.

Long. 18 mm.

♂. Mandibles strongly bidentate at the apex, the outer tooth the longest; clypeus short, transverse, with a strong median carina. Flagellum punctured, hairy, becoming slender towards the apex, scape smooth and shining, the antennae as long as the thorax and median segment combined. Head very large, broader than the thorax, broadly emarginate posteriorly, closely and coarsely punctured-reticulate; eyes very near to the base of the mandibles, separated from the posterior margin of the head by a distance exceeding their own breadth; the cheeks broader than the eyes, sparsely but deeply punctured, bearing a stout, acute, spine. Pronotum short, strongly narrowed anteriorly, the anterior margin raised, a deep groove along the posterior margin. Mesonotum coarsely punctured, more sparsely on the middle than on the sides, the parapsidal furrows shallow; scutellum very sparsely punctured; mesopleurae closely and coarsely punctured, with a shining, almost smooth, area behind the wings. Median segment irregularly rugulose, with two longitudinal carinae close together, the narrow space between the carinae transversely striated, the sides of the segment strongly horizontally striated, the apical slope more finely transversely striated. Abdomen shining, almost smooth; the seventh dorsal segment sparsely and shallowly punctured, broadly truncate at the apex; apical ventral segment closely punctured, hairy, deeply divided longitudinally in the middle. Radial cell open at the apex, but the radius is indicated by a brown continuation almost to the apex of the wing; cubitus indicated by a white scar beyond the first transverse cubital nervure, the latter indicated by a brown scar, the second transverse cubital by a white scar.

Hab. Sierra Leone, Tamadu (*J. J. Simpson*), June.

There is no tooth on the inner side of the mandibles as there is in *D. conradti*, Stadelm., and the carina of the prosternum is not furcate as in *D. rosmarus*, Stadelm.

Family MUTILLIDAE.

Ephutomorpha contigua, sp. n.

♀. Nigra; mandibulis basi, tuberculisque antennalibus fusco-ferrugineis; thorace rufo-ferrugineo; flagello subtus, tarsisque brunneo-ferrugineis; segmento dorsali primo apice late luteo; segmento dorsali secundo obscure aeneo-virescente.

Long. 4 mm.

♀. Antennal tubercles well developed, rounded; second joint of the flagellum distinctly longer than the third. Eyes oval, with distinct facets, situated nearer to the posterior margin of the head than to the base of the mandibles. Head nearly as broad as the thorax, feebly rounded at the posterior angles, closely and not very finely punctured. Thorax closely punctured rugose on the anterior two-thirds, the apical third coarsely rugose, the sides of the apical slope feebly serrate; the thorax broadest anteriorly, the anterior angles feebly rounded, the anterior margin almost transverse, the length of the thorax greater by about one quarter than the greatest breadth, abruptly but not strongly narrowed behind the middle, a small tuft of erect white hairs on the mesopleurae. Second dorsal segment a little longer than the greatest breadth, the sides rather strongly convex, closely punctured rugulose; with an apical patch of white hairs, which is continued as a median band on the third, fourth and fifth segments. Pygidial area triangular, finely longitudinally striated.

Hab. S. Queensland, Brisbane (*Hacker*), December.

Nearest to *E. virulenta*, Turn., from S.W. Australia, but the thorax is less strongly narrowed posteriorly than in that species, the colour of the thorax is much brighter, and the spots of pubescence on the dorsal segments are different, *virulenta* having an apical fascia of white pubescence instead of an apical spot.

Ephutomorpha lurida, sp. n.

♀. Pallide ferruginea; segmento dorsali secundo fascia mediana longitudinali nigra, segmentis quinto sextoque fuscis; segmento dorsali secundo macula magna utrinque fasciaque angusta apicali, tertioque macula mediana albopilosis; area pygidiali late triangulari, delicatissime punctata.

Long. 5–6 mm.

♀. Head and thorax sparsely clothed with pale fulvous pubescence; antennal tubercles fairly well developed, second joint of the flagellum very little longer than the third. Eyes round, strongly convex, much nearer to the posterior margin of the head than to the base of the mandibles. Head narrower than the thorax, strongly rounded at the posterior angles, finely and closely punctured. Thorax fully half as long again as the greatest breadth, strongly narrowed posteriorly, the apical margin scarcely more than half as wide as the basal; the anterior margin feebly arched, not quite transverse, rugose, more coarsely at the apex than at the base, the posterior slope coarsely rugose. Second dorsal segment finely longitudinally rugulose; fully half as long again as the greatest breadth, the sides very feebly convex. Sides of the abdomen thinly clothed with long fulvous hairs; pygidial area broadly triangular, very minutely punctured. Hind tibiae with one row of four spines.

Hab. N. Queensland, Townsville (*F. P. Dodd*), September.

This belongs to the group of *E. darwiniana*, André, and *E. excerpta*, Turn., but differs from both in colour; from the former in the more strongly narrowed apical portion of the thorax, the longer second abdominal segment and the sculpture of the pygidial area; from the latter in the more gradually narrowed thorax and in the less convex sides of the second abdominal segment.

Ephutomorpha diversipes, sp. n.

♀. Nigra; vertice late, fronte nigro intaminato, thoraceque ferrugineis; tuberculis antennalibus, flagello articulo primo, tarsisque pallide testaceis; segmento dorsali primo fascia apicali pallide lutea; calcaribus pallidis; segmentis dorsalibus 2–5 fascia mediana longitudinali continua albido pilosa.

Long. 5 mm.

♀. Antennal tubercles well developed, rounded; second joint of the flagellum distinctly longer than the third. Head a little narrower than the thorax, rounded at the posterior angles; finely and closely punctured on the vertex, more deeply but not so closely on the front. Eyes nearer to the posterior margin of the head than to the base of the mandibles, round and strongly convex. Thorax a little less than half as long again as the greatest breadth, broadly rounded on the anterior margin, slightly narrowed posteriorly, longitudinally rugose striate on the basal two-thirds, coarsely rugose on the apical third; the posterior slope almost vertical, coarsely rugose, with two minute lateral teeth close to the basal angles. Second dorsal segment finely longitudinally rugose, about one-third longer than the greatest breadth, the sides moderately convex. Pygidial area very narrowly rounded at the apex, finely longitudinally striate on the basal half. Hind tibiae with two rows of four rather feeble spines.

Hab. N. Queensland, Townsville (*F. P. Dodd*), November and June.

Near *E. vittigera*, André, a variety of which occurs in October in the same locality. It differs in the sculpture of the thorax, which does not run into striae in *vittigera*, in the absence of fulvous hairs on the thorax, in the ferruginous colour of the head and thorax, in the feebler spines of the hind tibiae, and in the colour of the tarsi; it is also a smaller species.

Ephutomorpha unilineata, sp. n.

♀. Nigra; capite fusco-ferrugineo, fronte et vertice nigro intaminatis; scapo fusco; flagello infra pallide testaceo; thorace rufo-ferrugineo, brevi, latitudine vix longiore; segmento dorsali primo fascia apicali pallide lutea; segmentis dorsalibus 2–5 fascia mediana longitudinali continua albopilosa; area pygidiali late triangulari, longitudinaliter striata; calcaribus pallidis.

Long. 5 mm.

♀. Antennal tubercles rather large, with a low transverse carina between them; second joint of the flagellum short, no longer than the third. Eyes round, strongly convex, situated nearer to the hind margin of the head than to the base of the mandibles. Head narrower than the thorax, broadly rounded posteriorly; the front rugose, the vertex closely punctured. Thorax closely punctured rugose, scarcely longer than the greatest breadth, slightly narrowed from the middle both anteriorly and posteriorly, the anterior margin straight, the posterior slope almost vertical, shallowly rugose, pleurae almost smooth. First dorsal segment short, slightly depressed below the second, which is nearly half as long again as its greatest breadth, finely and closely punctured, the sides somewhat convex. The sides of the abdomen sparsely clothed with long white hairs, interspersed with black near the apex. Hind tibiae with two rows of four spines.

Hab. S. Queensland, Brisbane (*Hacker*), November.

Allied to *E. argenteolineata*, André, but may be distinguished by the colour of the legs, the distinctly stronger sculpture of the head and thorax, the slightly different shape of the latter, and the distinctly longer second abdominal segment.

Ephutomorpha setigera, sp. n.

♀. Nigra; tuberculis antennalibus pallide testaceis; segmento dorsali primo margine apicali pallide luteo; segmento dorsali secundo in medio longitudinaliter late, tertio, quarto, quintoque in medio, sextoque basi brunneo-ferrugineis; tarsis fusco-ferrugineis.

Long. 6 mm.

♀. Clypeus small and flat, truncate at the apex; antennal tubercles rather large, second joint of the flagellum a little longer than the third, less than twice as long as the first; a low carina from the antennal tubercles not reaching the eyes. Head closely and rather strongly punctured, more sparsely on the front than on the vertex, sparsely clothed with close lying fulvous bristles, interspersed with which are a few long black hairs. Eyes round, strongly convex, situated nearer to the hind margin of the head than to the base of the mandibles; the head rounded at the posterior angles, no wider than the thorax. Thorax granulate-rugose, more coarsely posteriorly than anteriorly, nearly half as long again as broad, the sides almost smooth, the posterior slope finely rugulose, the sides almost parallel, the anterior angles rounded, the dorsal surface clothed with short setae as the head, but with rather more numerous long black hairs. Dorsal segments 1–5 with a small patch of sparse white hairs in the middle of the apical margin; second segment half as long again as the greatest breadth, the sides convex, closely but not very coarsely punctured, the punctures confluent longitudinally. Pygidial area triangular, finely longitudinally striated, the striae not reaching the apex. Base of the abdomen with long whitish hairs, the hairs on the sides of the abdomen whitish near the base, mostly black near the apex. Hind tibiae with two rows of four spines.

Hab. S. Queensland, Brisbane (*Hacker*), November.

Family THYNNIDAE.

Zaspilothynnus striatifrons, sp. n.

♂. Niger; mandibulis, apice excepto, clypeo macula subapicali fusca utrinque, orbitis, macula arcuata inter antennas, pronoto margine antico, propleuris, pronoto margine postico, tegulis, mesonoto macula magna quadrata postice, mesopleuris antice et macula magna postice, scutello fascia latissima, postice ad apicem producta, scutelli angulis anticis, postscutello, segmento mediano fascia lata longitudinali lateribusque, segmentis dorsalibus 1–6, ventralibus 2–5 fascia transversa anguste interrupta, segmento primo ventrali macula mediana, coxisque subtus flavis; segmento dorsali sexto apice, septimoque, ventralibus sexto septimoque pedibusque ferrugineis; alis subhyalinis, venis ferrugineis.

♀. Nigra; capite ferrugineo, pedibus brunneo-ferrugineis, femoribus nigro-maculatis; sterno, segmentisque ventralibus secundo tertioque brunneis; prothorace postice nigro-marginato, scutello, postscutello, segmento mediano lateribus, segmentis dorsalibus 1–3 fascia transversa undulata, segmentoque dorsali quarto fascia transversa interrupta flavis; pygidio fusco.

Long. ♂, 15 mm; ♀, 13 mm.

♂. Clypeus pointed and prominent at the base and connected by a short carina with the interantennal prominence, very broadly truncate at the apex, the apical angles not prominent, strongly longitudinally striated. Interantennal prominence very broadly triangular, a low longitudinal carina from the apex reaching more than half-way to the anterior ocellus. Front rugosely punctured, irregularly rugose striate above the base of the antennae; vertex more sparsely punctured. Antennae about as long as the thorax and median segment combined; pronotum rather sparsely and finely punctured, with a shallow shining groove behind the slightly raised anterior margin; mesonotum very closely punctured between the deep parapsidal furrows, but much more sparsely in the middle. Scutellum very broadly rounded at the apex, subtruncate, rather closely punctured; median segment oblique from the postscutellum, finely rugulose, the middle rather sparsely punctured. Abdomen somewhat elongate, the basal dorsal segment oblique anteriorly, as broad at the apex as the second segment, all the segments rather sparsely punctured and not constricted; sixth ventral segment with a spine on each side at the apical angles; seventh dorsal segment produced into a broad flattened lamella, longitudinally striated and very broadly rounded at the apex. Hypopygium obliquely striated above, subtriangular, broad at the base with a distinct spine on each side at the basal angles, narrowly rounded at the apex. Maxillae with a few long hairs at the base beneath. Wings sparsely clothed with very short hairs, third abscissa of the radius much longer than the second, first recurrent nervure received a little beyond two-thirds from the base of the second cubital cell, second a little before one-third from the base of the second cubital cell.

♀. Mandibles acute at the apex; clypeus punctured, without a carina, truncate at the apex. Front with a large concave area on each side touching the inner margin of the eye and extending nearly to the vertex, smooth and shining; the ridge between the depressions not quite as wide as one of them, smooth and shining, with a median longitudinal sulcus and with a few punctures on the sides; vertex shining, with a few scattered punctures. Head nearly twice as broad as long, rounded at the posterior angles. Pronotum broader than the head, the anterior margin straight, slightly narrowed posteriorly, the hind margin broadly arched, twice as broad anteriorly as long, shallowly punctured, with a few large setigerous punctures on the anterior margin. Scutellum smooth and shining, broadly truncate at the apex; postscutellum plainly visible, transverse. Median segment very short, the dorsal surface scarcely half as long as the scutellum, widened from the base, almost vertically truncate posteriorly, the dorsal surface smooth and shining, the face of the truncation microscopically punctured. Dorsal surface of the abdomen shining, with a few scattered punctures; first segment almost vertically truncate anteriorly, with a deep groove close to the apical margin and a few indistinct, short, transverse striae close to the apical angles; second segment with numerous transverse striae, which gradually increase in height from the base to the apex, the basal striae strongly curved, those at the apex straight. Ventral segments coarsely, but not very closely, punctured; the fifth segment coarsely longitudinally striated. Pygidium narrow, transversely striated at the base, vertically truncate posteriorly, strongly compressed before the truncation, the dorsal plate of the truncation narrowly rounded at the base, broadly rounded at the apex, with about ten arched striae, longer than the greatest breadth, scarcely reaching beyond the middle of the truncation; the ventral plate rather broadly truncate at the apex, finely, but distinctly serrate at the sides. Basal joint of intermediate tarsi rather broad, with six stout spines on the outer margin.

Hab. Queensland, Stradbroke Island, Moreton Bay (*H. Hacker*), September 17, 1915.

This is intermediate between *Thynnus* and *Zaspilo-*

thynnus, and perhaps might be placed in the former genus. The nearest ally seems to be *Thynnus brisbanensis*, Turn., but it is also very near *Zaspilothynnus rufoluteus*, Turn. It differs from *brisbanensis* in the form of the hypopygium, in the more oblique median segment, and in the less truncate first dorsal segment, also in the colour of the legs and apical abdominal segments. The distinct postscutellum of the female is remarkable.

Family SCOLIIDAE.

Subfamily *ELIDINAE*.

Elis (Mesa) nursei, Turn.

Plesia nursei, Turn., Ann. and Mag. Nat. Hist. (8), iii, p. 480, 1909, ♂.
Elis (*Mesa*) *nursei*, Turn., Proc. Zool. Soc. London, p. 721, 1912, ♂.

♀. Nigra, capite thoraceque crasse, abdomine sparse punctatis, pygidio longitudinaliter rugose striato, alis hyalinis, venis pallide testaceis; tegulis testaceis, calcaribus albidis.

Long. 13 mm.

♀. Clypeus with a low carina, strongly punctured, the apical margin smooth and transverse. Head coarsely punctured, the punctures on the front more or less confluent; scape smooth and shining above, with a few strong piliferous punctures beneath; pronotum coarsely punctured, mesonotum and scutellum rather more sparsely punctured, the parapsidal furrows very distinct. Median segment more finely punctured, not margined posteriorly, the posterior slope rugulose, two convergent longitudinal carinae from the base close to the middle of the median segment. Abdomen rather sparsely and shallowly punctured, the punctures rather large; sixth dorsal segment longitudinally rugose-striate, narrowly rounded at the apex. Basal joint of the hind tarsi with a row of close set hairs beneath. Second abscissa of the radius very little shorter than the third, first recurrent nervure received just before the middle of the second cubital cell, second just before three-quarters from the base of the third cubital cell.

Hab. Simla (*Nurse*), September.

This is nearest to *E. ustulata*, Turn., but the sculpture is much coarser and the sixth dorsal segment much more narrowly rounded than in that species. *E. nursei* ♀ was identified by Cameron for Colonel Nurse as *anthracina*, Sm.; but, as I have pointed out in other papers, that insect is an *Anthobosca* and is Australian; not Indian, as stated by Smith and Bingham.

Elis (Mesa) heterochroa, sp. n.

♀. Fusco-ferruginea; mandibulis apice, flagello, pleuris, sterno, coxis posticis subtus, segmento mediano, segmento ventrali primo, segmentisque dorsalibus 1–4 margine apicali late nigris; calcaribus albidis; alis pallide flavo-hyalinis, venis fuscis; segmento dorsali sexto longitudinaliter striato, apice truncato.

♂. Niger; clypeo apice, mandibulis apice excepto, macula transversa utrinque inter antennas, pronoto macula transversa mediana, tegulis basi, segmentis dorsalibus 1–6 fascia angusta apicali lateribus dilatata, in medio anguste interrupta, segmentis ventralibus 2–5 macula parva apicali utrinque, coxis subtus, femoribus anticis posticisque subtus et apice, intermediis apice, tibiis anticis intermediisque supra, posticis basi, tarsisque hic illic infuscatis, flavis; alis hyalinis, stigmate venisque nigris.

Long. ♀, 18 mm; ♂, 17 mm.

♀. Clypeus sparsely but rather strongly punctured, with a low median carina which does not reach the broadly truncated apex. Head coarsely and closely punctured, more sparsely on the vertex than on the front, antennal tubercles well defined. Scape smooth above, beneath punctured, with long pale fulvous setae towards the apex. Pronotum coarsely and closely punctured, subcarinate longitudinally in the middle; scutellum and mesonotum rather more sparsely punctured; pleurae more finely and shallowly punctured. Median segment subopaque, with a longitudinal impressed line on the dorsal surface, the puncturation shallow and obscure, finer at the base than at the apex, the posterior slope shallowly punctured-rugulose, the sides of the segment very finely and closely striated and clothed with short white pubescence. Abdomen shining, sparsely punctured, more closely on the fourth and fifth than on the basal segments, ventral segments more coarsely punctured than the dorsal. Sixth dorsal segment closely longitudinally striated, the apical margin broadly smooth and rather broadly truncate at the apex. Second abscissa of the radius as long as the third, first recurrent nervure received close to the middle of the second cubital cell, second just before two-thirds from the base of the third cubital cell. Basal joint of the hind tarsi with a close row of hairs beneath mingled with a few spines.

♂. Clypeus finely punctured, clothed with white pubescence, slightly convex, subcarinate longitudinally at the base. Inter-antennal prominence bilobed; the front rugose, the vertex punctured. Head much broader than the thorax; rounded at the posterior angles; the posterior ocelli further from the eyes than from each other; antennae about as long as the head, thorax and median segment combined. Thorax punctured, more finely and sparsely on the scutellum than elsewhere, mesopleurae finely rugose; pronotum shorter than the mesonotum, the anterior margin straight, the angles not prominent. Median segment closely and strongly punctured. First abdominal segment long; the petiole occupying rather more than the basal third of the segment, rather shorter than the basal joint of the hind tarsi; the apical portion moderately swollen, the extreme apex a little constricted; second segment scarcely more than half as long as the first, broadened from the base, longer than the apical breadth; third segment a little broader than long; basal segment smooth and shining, the remaining segments gradually becoming more strongly punctured; the punctures on the sixth dorsal segment large but rather sparse; seventh segment smooth at the base, with a few large punctures before the apex, the apical emargination narrow, a little deeper than its apical breadth. Second abscissa of the radius about equal to the third.

Hab. Nyasaland, Mlanje (*S. A. Neave*), December to June.

The female is very near *E. heterogamia*, Sauss., which occurs in the same district, and may prove to be only a variety of that species, but the difference in the colour of the legs and abdomen seems to be constant. The nine females in the collection were taken from January to June, seven of them in February, specimens of *heterogamia* being taken from December to June. The male has the first abdominal segment distinctly more elongate than in *clavata*, Sauss., and the colour of the nervures is different. In some specimens of the male the clypeus is wholly black, and in some the yellow mark on the pronotum shows a tendency to disappear.

Elis (Mesa) erythropoda, Turn.

Plesia (*Mesa*) *erythropoda*, Turn., Ann. and Mag. Nat. Hist. (8), i, p. 505, 1908, ♀.

The type was from Lake Ngami. Mr. Neave has sent a series of the female from Mlanje, taken from January to May. In these specimens the head is more sparsely punctured than in the type.

Elis (Mesa) arnoldi, sp. n.

♀. Nigra; mandibulis dimidio apicali fusco-ferrugineis; flagello subtus fusco; pronoto propleurisque rufis; calcaribus albidis; unguiculis pallide testaceis; alis hyalinis, venis fuscis.

Long. 9 mm.

♀. Clypeus subcarinate longitudinally in the middle, the apical margin transverse and slightly depressed. Front closely and strongly, vertex and pronotum less closely punctured; mesonotum and scutellum sparsely punctured. Propleurae sparsely, mesopleurae very closely and strongly punctured; median segment more finely and very closely punctured, with the usual shallow, margined, longitudinal groove from the base, the sides of the segment finely and closely striated. Abdomen rather closely and shallowly punctured on the dorsal surface; the ventral surface more finely and closely punctured at the base of the segments, the groove between the two basal ventral segments very deep as in other species of the genus. Sixth dorsal segment closely punctured at the base, the punctures towards the apex intermingled with fine longitudinal striae, the apical margin broadly smooth and pale testaceous, broadly rounded at the apex. Third abscissa of the radius twice as long as the second, recurrent nervures received distinctly beyond the middle of the second and third cubital cells. Basal joint of the hind tarsi with a scopa of fine whitish hairs beneath.

Hab. S. Rhodesia, Buluwayo (*G. Arnold*), March.

In colour this species somewhat resembles *Anthobosca erythronota*, Cam., but is generically distinct. The sculpture of the sixth dorsal segment separates it from all other African species of *Elis*, the segment being nearly always striated; in *E. peringueyi*, Sauss., in which it is punctured, the punctures are very coarse and sparse.

Pterombrus williamsi, sp. n.

♂. Niger; mandibulis ferrugineis; abdomine segmentis tertio quartoque apice lateribusque, quinto, sexto septimoque omnino rufo-ferrugineis; alis hyalinis, venis nigris.

Long. 7 mm.

♂. Head shining, sparsely and rather finely punctured; antennal tubercles well defined, forming short longitudinal carinae. Mandibles bidentate at the apex; labrum transverse, with an apical fringe of hairs. Pronotum distinctly longer than the mesonotum, the anterior margin distinctly raised, rather sparsely punctured; mesonotum rather more strongly punctured; scutellum as long as the mesonotum; median segment very coarsely rugose, the sides finely and closely striated. Abdomen smooth and shining, petiolate; the first segment as long as the second and third combined, very narrow at the base, the apical half moderately swollen and slightly constricted at the apex; the second segment twice as broad at the apex as at the base; the recurved apical spine of the hypopygium rather short. First recurrent nervure received just before one-quarter from the base of the second cubital cell, second just before one-third from the base of the third cubital cell. Third abscissa of the radius as long as the second and first combined, second fully twice as long as the first.

Hab. British Guiana, Bartica (*C. B. Williams*), September.

This is distinguished from other known males of the genus by the black basal and red apical segments of the abdomen; the anterior margin of the pronotum is raised, which is not the case in *glabricollis*, Dücke, or *confusus*, Sm.

Family PSAMMOCHARIDAE.

The two following species belong to the wide-ranging genus *Episyron*, in which the tarsal ungues are bifid in both sexes, the cubitus of the hindwing originating just before the transverse median nervure, the third cubital cell much shorter than the second and strongly narrowed on the radius, the first dorsal segment clothed more or less densely with scale-like hairs, and the male antennae rather slender, with the joints not arcuate beneath. The labrum is slightly exposed.

1. **Episyron lepidohirtus,** Turn.

Anoplius (*Episyron*) *lepidohirtus*, Turn., Proc. Zool. Soc. London, p. 331, 1910, ♀ ♂.

This is a true *Episyron*, nearly related to the European *P. rufipes*, the type of the genus. It is very closely related to the New Guinea species *E. papuensis*, Sm.

Hab. N. Queensland, Mackay to Cooktown.

2. **Episyron kurandensis,** Turn.

Anoplius (*Episyron*) *kurandensis*, Turn., Proc. Zool. Soc. London, p. 333, 1910, ♀.

The scale-like hairs on the first dorsal segment are not very strongly developed in this species.

Hab. N. QUEENSLAND, Kuranda.

Genus PSAMMOCHARES, Latr.

The Australian species still included in this genus fall into several sections, which will doubtless eventually be raised to generic rank; but I consider it best to wait until a more comprehensive revision is possible, in the meantime defining certain groups of related species. One of these groups, somewhat allied to *Batozonus*, Ashm., and *Episyron*, Schiodte, has the tarsal ungues of both sexes bifid as in the latter genus, but has the joints of the flagellum in the male strongly arcuate beneath as in *Batozonus*, though shorter than in that genus, and differs from both in having the cubitus of the hindwing interstitial with the transverse median nervure. The median segment of the female is truncate at the apex and more or less emarginate, with a distinct median sulcus on the dorsal surface; and the third cubital cell is much narrowed on the radius. The sexual dimorphism in the group is great, much greater than in *Episyron*, though less than in *Batozonus*. The species included are—

1. **Psammochares consimilis**, Sm.

Pompilus consimilis, Sm., Descr. new species Hymen., p. 152, 1879, ♀.

♀. Nigra; fronte, vertice, pronotoque pilis brevissimis aurantiacis, subsquamosis, stratis, dense obtectis; postscutello macula utrinque segmentoque mediano angulis posticis albo-pilosis; segmentis dorsalibus 2–3 fascia transversa grisea utrinque; alis fuscis, apice obscurioribus, venis fuscis.

♂. Niger; antennis fusco-ferrugineis, scapo supra infuscato, segmento dorsali sexto albido; segmento mediano angulis posticis albo-pilosis; fronte, pronoto, segmentis dorsalibus 1–3 fascia lata basali, quarto quintoque omnino griseo-pubescentibus; alis fusco-hyalinis, apice obscurioribus.

Long. ♀, 14 mm; ♂, 12 mm.

♀. Clypeus widely but very shallowly emarginate at the apex, the labrum exposed. Head somewhat flattened, the posterior ocelli nearly twice as far from each other as from the hind margin of the head. Second joint of the flagellum less than half as long again as the third. Pronotum arched posteriorly, not angulate, almost as long as the mesonotum; scutellum depressed at the sides. Median segment longer than the mesonotum, with a distinct median sulcus, rather strongly emarginate at the apex, the apical slope almost vertical. Second ventral segment convex, pygidium smooth. Basal joint of the fore tarsi with four short spines, all the ungues bifid. Third cubital cell pointed on the radius, subpetiolate.

♂. Clypeus broadly and shallowly emarginate, the labrum exposed. Head flattened, the front subcarinate longitudinally from the anterior ocellus but grooved on the lower part towards the base of the antennae, the posterior ocelli very near the hind margin of the head; antennae stout, tapering towards the apex, very little longer than the thorax and median segment combined, fifth to eleventh joints of the flagellum strongly arcuate beneath. Hind margin of the pronotum with a distinct angle in the middle. Median segment without a distinct sulcus, the apical slope less abrupt than in the female and less deeply emarginate. First abdominal segment long, second ventral segment convex, with a distinct, though shallow, transverse impressed line near the base. Third cubital cell not quite pointed on the radius, but the third abscissa of the radius is extremely short. All the tarsal ungues bifid. The distance between the base of the mandibles and the eyes is considerable.

Hab. Queensland, Mackay (*Turner*), March; Brisbane, (*Hacker*), January and February.

The male has not been previously described; the description is taken from two Mackay specimens; the specimen from Brisbane is without the transverse groove near the base of the second ventral segment, but does not differ otherwise. The female shows no trace of such a groove, the presence of which in males is most remarkable. The female has a strong superficial resemblance to *Psammochares frontalis*, Fabr., which belongs to another section of the genus and has the tarsal ungues unidentate, not bifid.

2. **Psammochares doddi**, Turn.

Anoplius doddi, Turn., Proc. Zool. Soc. London, p. 328, 1910, ♀.

♂. Niger; flagello articulis secundo tertioque subtus fulvis; clypeo macula magna utrinque, pronoto margine posteriore, segmento dorsali tertio fascia basali interrupta, segmento dorsali septimo, calcariis, tibiisque posticis supra albido flavis; alis hyalinis, fascia apicali fusca, extremo apice hyalinis. Var. segmento mediano angulis apicalibus, segmentoque secundo dorsali macula basali utrinque flavis.

Long. 8–9 mm.

♂. Clypeus truncate at the apex, the labrum exposed. Fourth to eleventh joints of the flagellum strongly arcuate beneath; eyes only narrowly separated from the base of the mandibles. Head somewhat flattened, the posterior ocelli very near the hind margin of the head. Hind margin of the pronotum strongly arched, not angulate. Median segment with a distinct longitudinal sulcus, shorter than the mesonotum, steeply sloped posteriorly, but not abruptly truncate, with patches of white pubescence at the apical angles. First dorsal segment rather densely clothed with scale-like hairs, as in the genus *Episyron*, fourth, fifth and sixth segments covered with grey pubescence; second ventral segment convex, seventh with a longitudinal carina. Third abscissa of the radius about half as long as the second.

Hab. Queensland, Townsville (*Dodd*); Mackay (*Turner*), January to March; Brisbane and Stradbroke Island (*Hacker*), October to February; Northern Territory, Alexandria (*Stalker*), January; Hermannsburg (*Hillier*), April.

The female is easily distinguished by the fasciate forewings.

The following species are very closely allied to *Episyron*, but differ in having the third cubital cell much larger than the second and the cubitus of the hindwing in most specimens interstitial with the transverse median nervure. The forewings are crossed by two fuscous fasciae. They form a generic group.

1. **Psammochares limpidus**, Turn.

Anoplius (*Episyron*) *limpidus*, Turn., Proc. Zool. Soc. London, p. 332, 1910, ♀♂.

This is not a true *Episyron*, and pending a revision, must be retained in *Psammochares*.

Hab. N. Queensland, Kuranda.

2. **Psammochares muiri**, sp. n.

♀. Nigra; mandibulis basi, clypeo dimidio apicali, scapo, pronoto margine postico, pedibusque anticis brunneo-ferrugineis; flagello subtus, tegulisque fusco-ferrugineis; alis hyalinis, anticis fusco bifasciatis.

Long. 8 mm.

♀. Clypeus transverse at the apex, clothed with delicate white pubescence, microscopically punctured, with a very sparse transverse row of large punctures near the middle, from each of which springs a long black hair. Eyes distinctly divergent towards the clypeus; the posterior ocelli as far from each other as from the eyes; a distinct frontal sulcus reaching the anterior ocellus. Antennae slender, the second joint of the flagellum as long as the first and third combined. Pronotum strongly arched posteriorly, not angulate in the middle; scutellum rather strongly compressed laterally, the dorsal surface small. Dorsal surface of the median segment shorter than the scutellum, much broader than long, without a median sulcus; the posterior slope oblique and clothed with short whitish pubescence. Abdomen opaque, the basal dorsal segment clothed with greyish scale-like hairs; sixth dorsal segment finely punctured and sparsely clothed with long fuscous hairs, elongate triangular; second ventral segment strongly convex. Third abscissa of the radius longer than the second, as long as the second transverse cubital nervure, the cubital margin of the third cubital cell half as long again as that of the second; first recurrent nervure received at two-thirds from the base of the second cubital cell, second just beyond the middle of the third cubital cell. Cubitus of the hindwing interstitial. Fore tarsi very feebly spined, the basal joint with three short spines; hind tibiae feebly spinose. The basal fascia of the forewing is not very broad and is situated on the outer side of the basal nervure, not reaching the costa; the second fascia very broad, crossing the wing, and occupying the whole of the radial and second and third cubital cells.

Hab. AMBOINA (*F. Muir*), October.

Easily distinguished from *limpidus* by the colour of the antennae and legs, but very close in structure.

Another group has the tarsal ungues unidentate in both sexes; the joints of the flagellum in the male not arcuate beneath; the second cubital cell always longer than the third on the radius, though not always on the cubitus; the median segment with a sulcus, usually strongly developed from base to apex; and the fore tarsi of the female in most species strongly spinose. The species are all black, with white or grey pubescence, rarely with orange close-lying hairs on the pronotum. To this section belong—

1. **Psammochares senex,** Turn.

Anoplius senex, Turn., Proc. Zool. Soc. London, p. 327, 1910, ♀.

Hab. VICTORIA.

2. **Psammochares atavus**, Turn.

Anoplius atavus, Turn., Proc. Zool. Soc. London, p. 326, 1910, ♀.

Hab. N.W. Australia.

3. **Psammochares ahrimanes**, Turn.

Anoplius ahrimanes, Turn., Proc. Zool. Soc. London, p. 326, 1910, ♀.

Hab. N. Queensland.

4. **Psammochares pluto**, sp. n.

♀. Nigra; alis nigro-violaceis; flagello subtus fusco; unguiculis unidentatis.

♂. Feminae simillimus; scapo subtus bruneo, orbitis internis anguste flavis; unguiculis unidentatis.

Long. ♀, 17 mm.; ♂, 14 mm.

♀. Clypeus broadly truncate at the apex, the labrum not exposed; second joint of the flagellum as long as the first and third combined, the third distinctly longer than the fourth. Eyes slightly divergent towards the clypeus, separated on the vertex by a distance equal to the length of the third joint of the flagellum. Pronotum shorter than the mesonotum, the posterior margin broadly arched, without a distinct angle; scutellum narrowly truncate at the apex. Median segment broader than long, without tubercles, rounded at the posterior angles, gradually sloped posteriorly, with a deep median sulcus from the base. Abdomen opaque, with a few long black hairs on the sides near the apex; sixth dorsal segment rather broadly rounded at the apex and sparsely clothed with long black setae. Basal joint of fore tarsus with three moderately long spines on the outer margin, hind tibiae spinose, tarsal ungues with one tooth. Third abscissa of the radius a little longer than the first, and more than two-thirds of the length of the second, submedian cell equal in length to the median, second recurrent nervure received beyond the middle of the third cubital cell, cubitus of the hind-wing interstitial with the transverse median nervure.

♂. Antennae not stout, the joints very slightly arcuate beneath, second joint of the flagellum scarcely longer than the third. Clypeus widely emarginate at the apex, the labrum exposed in the arch of the emargination. Median segment as long as broad, without a sulcus. Tarsal ungues unidentate, hind tibiae moderately spinose; neuration of wings as in the female.

Hab. Mackay, Q. (*Turner*), 1 ♀, November 1897; 1 ♂, February 1899.

5. **Psammochares frontalis,** Fabr.

Sphex frontalis, Fabr., Syst. Entom., p. 349, 1775, ♀.
Pompilus frontalis, Fabr., Syst. Piez., p. 188, 1804, ♀.

The male is similar to the female, but has the pubescence on the head and pronotum greyish instead of orange. The seventh dorsal segment is broadly truncate at the apex, the seventh ventral segment carinate longitudinally and produced into a short spine at the apex.

Hab. Queensland, Brisbane and Mackay.

6. **Psammochares semiluctuosus,** Sm.

Pompilus semiluctuosus, Sm., Cat. Hym. B. M., iii, p. 166, 1855, ♀.

This is a large species, with six long, slightly spatulate, spines on the basal joint of the fore tarsi.

Hab. Sydney.

7. **Psammochares berthoudi,** sp. n.

♀. Nigra, fronte, clypeo lateribus, pronoto marginibus, mesonoto fascia transversa apicali, scutello angulis basalibus, postscutello macula magna mediana, maculaque minore utrinque angulis apicalibus, mesopleuris fascia obliqua, segmento mediano angulis basalibus et apicalibus, segmento dorsali primo macula utrinque, segmentis dorsalibus 1–5 macula transversa apicali utrinque, segmentisque ventralibus secundo tertioque macula utrinque angulis apicalibus albido-pubescentibus; alis fuscis, apice obscurioribus, venis nigris; metatarso antico spinis septem longis instructo.

Long. 23 mm.

♀. Clypeus broadly truncate at the apex; second joint of the flagellum very long, nearly as long as the third and fourth combined; front flat, without a distinct sulcus, posterior ocelli much nearer to each other than to the eyes. Pronotum strongly arched posteriorly, not angulate; scutellum with a broad dorsal surface, not very strongly compressed laterally. Median segment scarcely longer than the pronotum, much broader than long, the sulcus on the dorsal surface very deep, the lateral tubercles not developed.

Sixth dorsal segment broadly rounded at the apex, with sparse punctures, each of which bears a long black hair. Basal joint of the fore tarsi with seven long slightly spatulate spines; intermediate and hind tibiae with a patch of grey pubescence at base and apex, fore tibiae with a line of grey pubescence on the outer side. Tarsal ungues unidentate. Second abscissa of the radius more than half as long again as the third, the second cubital cell as long on the cubitus as the third; first recurrent nervure received at about one-sixth from the apex of the second cubital cell, second close to the middle of the third cubital cell. Cubitus of hindwing interstitial.

Hab. S.W. AUSTRALIA, Waroona (*G. F. Berthoud*), January.

This is a western form of *semiluctuosis*, differing little from that species except in the presence of an additional spine on the basal joint of the fore tarsi, and in the much more broadly interrupted abdominal fasciae.

8. **Psammochares melancholicus,** Sm.

Pompilus melancholicus, Sm., Trans. Ent. Soc. London, p. 244, 1868, ♀♂.

This species closely resembles *semiluctuosus* in colour, but is much smaller, the joints of the flagellum are less elongate, the abdominal fasciae continuous, the sixth dorsal segment much more narrowly rounded at the apex, the basal joint of the fore tarsi with only three spines, and the median segment with an oblique band of cinereous pubescence on each side near the apex. The male has the apical ventral segment with a low longitudinal carina, the hairs on the segment and the apical fringe short; the sixth ventral segment almost flat, not strongly convex.

Hab. S.W. AUSTRALIA, Yallingup (*Turner*), October to December; Champion Bay (*Du Boulay*).

Smith's type is unfortunately lost, but his description of the species as only 5 lines long agrees with the present species much better than with the larger allied species occurring in the same locality. My specimens measure ♀, 13 mm.; ♂, 7 mm.

9. **Psammochares vassei,** sp. n.

♀. Differs from *melancholicus* in the larger size, the female measuring 18 mm., in the much broader apex of the sixth dorsal segment, in the more convex base of the second ventral segment, and in the presence of a fourth spine on the basal joint of the fore tarsus.

♂. Differs from *melancholicus* in the larger size, 11 mm.; in the strongly compressed sides of the apical ventral segment, which leave the median carina very prominent, the segment is also covered with long hairs, which are especially conspicuous along the carina and on the apical fringe; the sixth ventral segment is more convex than in *melancholicus*, and the fasciae of cinereous pubescence which in *melancholicus* are confined to the three basal segments extend in *vassei* to the sixth.

Hab. S.W. Australia, Yallingup (*Turner*), December.

10. **Psammochares bassianus,** sp. n.

♀. Closely allied to *vassei*, but has three spines only on the basal joint of the fore tarsi, the sixth dorsal segment is quite distinct, the apical half of the segment being smooth, shining, and slightly concave in *bassianus*, the apex a little produced and not very broadly rounded, in *vassei* the segment is slightly convex throughout, the apical half subopaque and very closely and minutely punctured and very broadly rounded at the apex; in *melancholicus* the segment is more narrowly rounded at the apex than in either, convex throughout, the apical quarter shining and almost smooth.

Hab. Tasmania, Eaglehawk Neck (*Turner*), February.

Unfortunately I did not take the male. The group of *melancholicus* seems to be very extensive and the species very closely allied, but differing especially in the apical segments of both sexes. I have two or three Eastern Australian forms, but have not sufficient material from which to describe them.

11. **Psammochares labilis,** Sm.

Pompilus labilis, Sm., Descr. new species Hymen., p. 151, 1879, ♂ (as ♀).

The thorax in this species is without pubescence in the female, but the pronotum of the male is covered with close-lying whitish hairs, the head also being covered with similar hairs in both sexes except on a transverse band across the ocellar region. The colour of the pubescence varies from whitish to dull yellowish. The female has three long spines on the basal joint of the fore tarsi.

Hab. QUEENSLAND, Townsville (*Dodd*), January and February; NORTHERN TERRITORY, Port Darwin (*G. F. Hill*); N.W. AUSTRALIA, Nicol Bay (*Dr. Clement*).

12. **Psammochares basilicus**, sp. n.

♀. Nigra, capite luteo pubescente, fascia transversa in regione ocellari nuda; segmento dorsali fascia angusta apicali subinterrupta, secundo tertioque macula transversa utrinque cinereopubescente; segmento mediano lateribus ante apicem distinctissime tuberculato.

Long. 19 mm.

♀. Very near *P. labilis*, but may be distinguished from that species by the absence of the very broad abdominal fasciae, by the presence of four long spines on the basal joint of the fore tarsi; the median segment has a very deep median sulcus and a blunt tubercle on each side before the apical angles, the tubercle being almost obsolete in *labilis*; in both the apical dorsal segment is broadly rounded at the apex, but the puncturation of the segment, though very minute in both, is more distinct in *labilis*. The second abscissa of the radius is scarcely twice as long as the third in *basilicus*, and in West Australian specimens of *labilis*, but about four times as long in Queensland specimens of *labilis*.

Hab. N. QUEENSLAND, Townsville (*Dodd*).

Nearly allied to this group but differing in having the submedian cell distinctly longer than the median in both sexes and the tarsal ungues in the male bifid are the two following species—

1. **Psammochares amoenulus**, Turn.

Anoplius amoenulus, Turn., Proc. Zool. Soc. London, p. 329, 1910, ♀.

Hab. QUEENSLAND, Brisbane and Mackay.

2. **Psammochares elatus**, Sm.

Pompilus elatus, Sm., Journ. Linn. Soc. Zool., viii, p. 82, 1864, ♀.

Hab. QUEENSLAND, Mackay and Townsville; MOLUCCAS, Morty Island.

Another generic group is easily distinguished by the coarse granulation of the thorax, especially strong on the median segment; by the very long submedian cell, which is much longer than the median; by the very short third cubital cell, which is twice as long on the cubitus as on the radius, but no longer on the cubitus than the length of the third transverse cubital nervure; by the red colour of the thorax and median segment, and by the unidentate tarsal ungues. To this group belong—

1. **Psammochares erythrostethus**, Sm.

Pompilus erythrostethus, Sm., Cat. Hym. B. M., iii, p. 162, 1855, ♀.

The male of this wide-ranging species is unknown, but I have seen a male closely resembling this female, but with red legs, from Western Australia.

Hab. S.W. AUSTRALIA, Yallingup (*Turner*), November to January; TASMANIA, Eaglehawk Neck (*Turner*), February; QUEENSLAND, Mackay.

2. **Psammochares perpulcher**, sp. n.

♀. Rufo-ferruginea; capite nigro; scapo subtus, mandibulis clypeoque ferrugineis; tarsis infuscatis; alis hyalinis, tertio apicali fasciaque mediana fuscis.

Long. 7 mm.

♀. Second joint of the flagellum as long as the first and third combined; the clypeus and lower part of the front clothed with silver pubescence. Head finely and very closely punctured; posterior ocelli further from the eyes than from each other. Thorax closely and very distinctly punctured; pronotum very widely arched posteriorly; scutellum subquadrate. Median segment coarsely granulate, without a sulcus, with short, spare, white pubescence. Abdomen shining, the punctures microscopic; sixth dorsal segment with a few large scattered punctures, broadly rounded at the apex. Fore tarsi with a short comb, the basal joint with four short spines. Cubitus of the hindwing originating just beyond the transverse median nervure.

Hab. QUEENSLAND, Townsville (*Dodd*), August.

Differs from *erythrostethus* in the smaller size, the sculpture of the thorax, the colour of the abdomen and legs, and the much shorter spines of the fore tarsi.

Agenioideus expulsus, sp. n.

♀. Nigra; pronoto margine postico late, tibiisque posticis macula basali albidis; calcaribus pallidis; alis hyalinis, anticis fusco bifasciatis, venis nigris.

♂. Feminae similis; tibiis intermediis etiam basi albido maculatis; segmento dorsali septimo albido; alis fascia basali subobsoleta.

Long. ♀, 7–8 mm.; ♂, 7 mm.

♀. Clypeus short and broadly truncate at the apex; antennae about as long as the thorax and median segment combined, the second joint of the flagellum as long as the first and third combined. Pronotum broadly arcuate posteriorly, not angulate; scutellum convex. Median segment slightly convex, oblique, the dorsal and posterior surfaces not separated, rather thinly covered with short white pubescence. Abdomen subopaque; the apical dorsal segment subtriangular, with a few rather long dark hairs. Tarsal ungues unidentate. Cubitus of the hindwing received at a distance beyond the transverse median nervure equal to the length of the transverse cubital nervure; submedian cell of the forewing very slightly longer than the median; third abscissa of the radius scarcely more than half as long as the second, the third cubital cell shorter on the cubitus than the second. The fascia on the basal nervure narrow, that from the radial cell broad, filling the second and third cubital cells.

♂. Tarsal ungues as in the female, but the tooth rather nearer to the apex.

Hab. Queensland, Mackay (*Turner*), November to March.

This seems to be undoubtedly congeneric with *A. humilis*, Cress., from N. America, the type of Ashmead's genus. The description of the genus, however, is far from accurate. The cubitus of the hindwing in all species of the genus known to me originates well beyond the transverse median nervure, though not so far as in the present species. The Indian *Pompilus maculipes*, Sm., also belongs to this genus.

Genus Austrosalius, gen. nov.

♀. Head small, flattened, rather longer than broad; clypeus very short, broadly truncate at the apex; the labrum exposed, emarginate at the apex. Pronotum long, sometimes longer than the mesonotum, sometimes a little shorter; median segment either vertically or obliquely truncate, opaque and smooth, with a median sulcus, the sides parallel, without tubercles; abdomen rather narrow, convex, the sides of the four basal segments almost parallel; the transverse line on the second ventral segment visible, but not deeply impressed. Fore femora very stout; fore tarsi without a comb; hind tibiae with a few small spines, not serrate. Second abscissa of the radius at least as long as the third, the recurrent nervures received at the middle of the second and of the third cubital cells; submedian cell of the forewing very slightly longer than the median; cubitus of the hindwing either interstitial with or originating just beyond the transverse median nervure. Male unknown.

Type of the genus *Ferreolomorpha artemis*, Turn.

1. **Austrosalius artemis,** Turn.

Ferreolomorpha artemis, Turn., Proc. Zool. Soc. London, p. 325, 1910, ♀.

Hab. Mackay, Q. (*Turner*), October to March.

2. **Austrosalius malignus,** Sm.

Salius malignus, Sm., Journ. Proc. Linn. Soc. Zool., iii, p. 157, 1858, ♀.

This is the only other species of the genus known to me. It is much larger than *artemis*, and the mesonotum is much longer, the colour of the antennae and of the wings is also different. It has not been recorded from Australia.

Hab. Aru (*Wallace*).

Nearly allied to this genus are the South Indian *Pseudagenia rava*, Bingh., and an allied species which seems to be undescribed; but in which the submedian cell is much longer, the head rather larger and the labrum not so strongly exposed. The tarsal ungues are bifid in these species, not unidentate as in *Austrosalius*. For this genus I propose the name

Cryptosalius, gen. nov.

Type of the genus *Pseudagenia rava*, Bingh.

1. **Cryptosalius rava,** Bingh.

Pseudagenia rava, Journ. Proc. Linn. Soc. Zool., xxv, p. 426, 1896, ♀.

Hab. Bangalore (*Bingham*); Coimbatore (*T. V. Rama Krishna*), February.

2. **Cryptosalius pandiyanus,** sp. n.

♀. Nigra, albopilosa; mandibulis ferrugineis, apice nigris; antennis tarsisque anticis fuscis; alis flavohyalinis, apice late infumatis, venis testaceis; vertice, pronoto postice, segmento mediano postice, segmentis dorsalibus 1–4 fascia lata apicali, segmentoque sexto, dense albopubescentibus; pronoto elongato, mesonoto duplo longiore.

Long. 6–8 mm.

♀. Head longer than the greatest breadth; clypeus short, the apical margin widely and very shallowly emarginate. Posterior ocelli about half as far again from the eyes as from each other; inner margins of the eyes parallel; the front with a distinct but very shallow longitudinal sulcus extending to the anterior ocellus. Front, pronotum and median segment, except broadly posteriorly, clothed with very short and sparse fulvous pubescence. Antennae short and stout, not more than twice as long as the head, second and third joints of the flagellum subequal. Pronotum at least twice as long as the mesonotum, narrower than the head, as long as the greatest breadth, very slightly narrowed anteriorly. Mesonotum very short; median segment shorter than the pronotum, obliquely sloped posteriorly, the sides parallel. Second ventral segment with a distinct transverse groove near the base. The whole ventral surface clothed with very delicate silver pubescence. Anterior tibiae produced at the apex without and ending in two spines; hind tibiae smooth. Second abscissa of the radius longer than the third; first recurrent nervure received close to the middle of the second cubital cell, second at about three-quarters from the base of the third cubital cell; submedian cell much longer than the median, cubitus of the hindwing interstitial with the transverse median nervure.

Hab. Coimbatore, S. India (*T. V. Rama Krishna*), January to August.

This is a much smaller species than *C. rava*, and may be distinguished by the very much longer pronotum, which in *rava* is much broader than long and no longer than the mesonotum. The third cubital cell is shorter than in *rava* and receives the recurrent nervure nearer to the apex. There is some difference in the present species in the length of the third cubital cell, specimens taken in July and August having the third abscissa of the radius as long as or longer than the second. The type was taken in January. There is also some variation in the position of the second recurrent nervure. But I regard these as individual variations only.

Cryptochilus commixtus, Turn.

Cryptocheilus commixtus, Turn., Proc. Zool. Soc. London, p. 317, 1910, ♀ ♂.

This species belongs to the group in which the male has the tarsal ungues bifid, while they are unidentate in the female. This structure is found in a considerable number of oriental and Malayan species, also in one or two Ethiopian species, but not as far as I know in any other Australian *Cryptochilus.* Superficially the species closely resembles *Hemipepsis australasiae,* but is not as plentiful and has a more limited range.

Hab. Mackay and Cairns, Q.

The nearest ally is *C. basimacula,* Cam., from New Britain.

Genus Cyphononyx, Dahlb.

Cyphononyx, Dahlb., Hymen. Europ., i, p. 461, 1843.

This genus was founded on the single character of the bifid tarsal ungues. But I am very doubtful if it will eventually stand, owing to the fact that a considerable number of species have males with the bifid tarsal ungues of *Cyphononyx* and females with the unidentate ungues of *Cryptocheilus.* At present I retain the name for those species in which the tarsal ungues are bifid in both sexes. Taken in this sense there is only one Australian species of the genus.

Cyphononyx aspasia, Sm.

Mygnimia aspasia, Sm., Journ. Proc. Linn. Soc. Zool., iii, p. 157, 1858, ♀.

A beautiful large species with yellow wings and the abdomen glossed with blue.

Hab. Mackay and Kuranda, Q. (*Turner*); New Guinea; Arn (*Wallace*); Ké (*Stalker*).

Cyphononyx vitiensis, sp. n.

♀. Nigra; capite, antennis, pronoto, mesonoto lateribus, tegulis, scutello, postscutello apice, segmentis abdominalibus tertio apice, quarto, quinto sextoque, pedibusque fulvo-ferrugineis; alis flavoaurantiacis, anticis macula magna mediana fusco-purpurea, apice leviter infuscatis, venis ferrugineis.

♂. Feminae similis; mesonoto fusco-ferrugineo.

Long. ♀, 18–21 mm.; ♂, 18 mm.

♀. Clypeus broad and transverse at the apex; labrum scarcely exposed, very broadly rounded at the apex and with a fringe of long fulvous hairs. Antennal prominence somewhat porrect, very feebly bilobed and divided by a strong longitudinal sulcus. Second joint of the flagellum a little longer than the first and third combined. Posterior ocelli further from the eyes than from each other. Pronotum short, rounded at the anterior angles, the posterior margin very broadly arched. Head and pronotum sparsely, mesonotum and scutellum closely, covered with short dark golden pubescence, the mesonotum and scutellum very finely and closely punctured; scutellum with a flat dorsal surface, broadly rounded at the apex; postscutellum subcarinate longitudinally in the middle, slightly produced in the middle posteriorly and rounded at the apex. Median segment with a blunt tubercle on each side at the base, with a deep median sulcus from base to apex, opaque, with very minute and indistinct transverse striae; the posterior slope oblique, not abruptly separated from the dorsal surface, sparsely clothed with fuscous hairs. Abdomen highly polished, with a few small scattered punctures; sixth dorsal segment more coarsely punctured, narrowly rounded at the apex, densely clothed with golden pubescence intermingled with coarse fulvous setae. Hind tibiae rather feebly serrate; tarsal ungues bifid; spines of the fore tarsi rather short. First recurrent nervure received at about three-quarters from the base of the second cubital cell, second just before the middle of the third cubital cell; third abscissa of the radius nearly half as long again as the second; cubitus of the hindwing interstitial with the transverse median nervure; submedian cell of the forewing longer than the basal.

♂. Antennae very long, measuring 15 mm., the whole length of the insect being 18 mm.; groove near the base of the second ventral segment very distinct, quite as deep as in the female; seventh dorsal segment very broadly rounded at the apex; sixth ventral segment widely emarginate at the apex, with a short acute spine on each side at the apical angles; seventh ventral segment flat, subquadrate, broadly truncate at the apex.

Hab. Fiji (British Museum ex *Crawley Coll.*); Fiji (*R. C. L. Perkins*), Fiji, Natova, Nadi (*R. Veitch*), October.

Not very nearly related to any other species known to me, though nearer to the group of *C. flavus*, Fabr., than to *C. aspasia*, Sm., and the related species *C. intrepida*, Sm., and *C. confector*, Sm.

Genus HEMIPEPSIS, Dahlb.

Hemipepsis, Dahlb., Hymen. Europ., i, p. 123, 1843.

I think this is a good genus and distinct from *Cryptocheilus*, Panz. After much consideration I disagree with Schulz, who uses Shuckard's name *Mygnimia* for the genus. This name was published in 1840, and therefore has priority over *Hemipepsis*. But no species are given in Shuckard's work, and the single character given, the position of the first recurrent nervure, would apply to other species not included in *Hemipepsis*, such as some species of *Cyphononyx*, equally well. Thus Shuckard's name should, in common with other names in the same work, be treated as a *nomen nudum*, and only date from Smith's publication of the name in 1855. There is only one Australian species of *Hemipepsis*.

Hemipepsis australasiae, Sm.

Mygnimia australasiae, Sm., Ann. and Mag. Nat. Hist. (4), xii, p. 259, 1873.

This seems to me to be the Australian form of the Indo-Malayan *H. aureosericeus*, Guér. It has a wide range in Australia, especially in the northern half of the continent.

Hab. Cooktown, Cairns and Mackay, Q.; Hermannsburg, Central Australia; Fowler's Bay, S.A.

Family CRABRONIDAE.

Subfamily *AMPULICINAE.*

Ampulex crawshayi, sp. n.

♀. Viridi-cyanea; antennis tarsisque nigris; mandibulis ferrugineis; alis hyalinis, venis nigris, anticis in cellulis radiali, cubitali secundo discoidalique secundo leviter infuscatis; abdomine segmentis apicalibus fortiter compressis.

Long. 20 mm.

♀. Carina of the clypeus sharply bent downwards near the apex, produced into a short blunt apical tooth. Second joint of the flagellum about equal to the combined length of the third and fourth; eyes separated on the vertex by a distance slightly less than the length of the second joint of the flagellum. Head strongly rugosely punctured, less coarsely on the vertex than on the front, the median frontal carina not nearly reaching the anterior ocellus, the lateral carinae curved, not straight, and meeting above the anterior ocellus. Pronotum rather long, narrowed anteriorly, sparsely punctured, produced posteriorly into a low tubercle, with a median sulcus reaching to the base of the tubercle, the anterior half of the sulcus with a few short transverse striae. Mesonotum and scutellum smooth, with a few scattered punctures. Median segment broader in the middle than long, the third carina in the middle as far from the fourth as from the second; the tubercles at the apical angles elongate triangular, not curved. Second dorsal segment at least one-quarter longer than the breadth in the middle, the sides not strongly convex; the three apical segments very strongly compressed laterally. Hind tibiae very sparsely punctured; fifth joint of the tarsi inserted at the base of the fourth, the latter not reaching the middle of the fifth joint. Length of the radius beyond the third cubital nervure less than half of the length of the second transverse cubital nervure. Three cubital cells.

Hab. Nyasaland, Kondowi, Lower Nyika (*R. Crawshay*), June.

In the compression of the apical segments of the abdomen this species resembles *A. sibirica*, Fabr. (*compressiventris*, Guér.); but in neuration is close to *assimilis*, Kohl., which, however, differs much in sculpture and other points.

Ampulex kristenseni, sp. n.

♀. Viridi-cyanea; clypeo antennisque nigris; tarsis fuscis; mandibulis, tibiis anticis, femoribusque ferrugineis; alis hyalinis, venis nigris, cellula radiali leviter infuscata.

Long. 16 mm.

♀. Clypeus strongly convex, porrect, the carina not produced into a tooth at the apex. Second joint of the flagellum as long as the third and fourth combined; eyes separated on the vertex by a distance scarcely exceeding the length of the second joint of the flagellum. Head rugosely punctured, the median frontal carina very short, not nearly reaching the anterior ocellus, the lateral frontal carinae well developed. Pronotum shining, feebly and irregularly transversely striated, with a median sulcus on the anterior portion, raised into a tubercle at the apex. Mesonotum in the middle and scutellum with a few scattered punctures, the sides of the mesonotum more closely punctured. Median segment as in *conigera*, Kohl., but with the tubercles at the apical angles much smaller and less curved. Second dorsal segment much broader than long, shorter than in *conigera*; second ventral segment convex at the base as in *conigera*. Fifth joint of the tarsi inserted close to the base of the fourth joint. Three cubital cells, the length of the radius beyond the junction of the third transverse cubital nervure equal to the length of the second transverse cubital nervure.

Hab. Abyssinia, Harar (*Kristensen*).

Very nearly allied to *conigera*, Kohl., but differs, as pointed out in the description, also in the much greater length of the radius beyond the third cubital cell, and in the narrower apical portion of the clypeus and shorter frontal carina.

Subfamily *STIZINAE.*

Stizus pacificus, sp. n.

♀. Nigra; labro, clypeo macula magna utrinque, orbitis interioribus, scapo subtus, flagello subtus, callis humeralibus, mesonoto angulis posticis, scutello macula utrinque, postscutello fascia angusta interrupta, segmento mediano angulis posticis, segmentis dorsalibus 1–4 macula transversa apicali utrinque, 2–5 striga transversa apicali in medio, tibiis anticis, intermediis subtus, tarsisque anticis subtus flavis; tibiis posticis tarsisque ferrugineis; mandibulis fusco-ferrugineis; alis hyalinis, leviter infuscatis, venis fusco-ferrugineis; segmento mediano angulis lateralibus fortiter excisis.

Long. 10 mm.

♀. Eyes separated at the base of the clypeus by a distance half as great again as the length of the scape. Head and thorax subopaque, very closely and minutely punctured and covered with very short fuscous pubescence, which is closer on the mesonotum than on the head; median segment much more strongly punctured, thinly covered with short whitish pubescence; abdomen rather less strongly punctured than the median segment, with faint blue tints in certain lights, sixth dorsal segment very closely punctured. Second cubital cell not petiolate, the first abscissa of the radius at least three times as long as the second.

Hab. Fiji, Natova, Nadi (*R. Veitch*), October.

This belongs to the group of *S. tridens*, Fabr., but differs in the colouring, especially of the legs, from the allied species. The infuscation of the wings is caused by numerous small hairs.

Subfamily *CRABRONINAE.*

Entomognathus rugosissimus, sp. n.

♀. Nigra; abdomine pedibusque ferrugineis; coxis anticis, trochanteribus anticis, femoribusque anticis subtus nigris; tegulis testaceis; alis fuscis, venis nigris; clypeo argenteo-pubescente.

Long. 8 mm.

♀. Mandibles deeply excised on the outer margin, simple at the apex. Clypeus raised into a porrect tubercle just above the middle of the apical margin, with a very short blunt tooth on each side near the apical angles. Eyes hairy, the facets in front rather larger than elsewhere. Head large, but not broader than the thorax; front broad, the eyes separated at the base of the clypeus by a distance equal to the length of the scape; antennae short and stout, the third joint of the flagellum as long as the second; ocellar region and vertex very coarsely punctured; ocelli in a very broad triangle, the posterior pair far apart, but nearly as far from the eyes as from each other, an irregular oblique groove from each posterior ocellus reaching almost to the eye. Pronotum transverse, rounded at the angles, punctured; mesonotum coarsely punctured-rugose; scutellum with sparse large punctures; mesopleurae coarsely, but rather sparsely, punctured, with a smooth groove in front for the reception of the anterior femora. Median segment very short, the dorsal surface only half as long as the scutellum; the basal area very broadly rounded at the apex, with several strong longitudinal carinae; the posterior slope abrupt, almost smooth, with a broad shallow median groove narrowing towards the apex. Abdomen sessile, the basal segment the broadest, the two basal dorsal segments with sparse, but rather large, punctures; the remaining segments with small scattered punctures; sixth dorsal segment rather narrowly triangular, clothed with golden pubescence. Hind tibiae hairy, almost unarmed, with feeble serrations near the apex; fore tarsi unarmed. Recurrent nervure received at three-quarters from the base of the cubital cell; radial cell broadly truncate at the apex, the transverse cubital nervure received at the middle of the radial cell.

Hab. NYASALAND, Mlange (*S. A. Neave*), January.

This is very distinct in colour and sculpture from other species of the genus, but does not differ much in structural characters.

Crabro veitchi, sp. n.

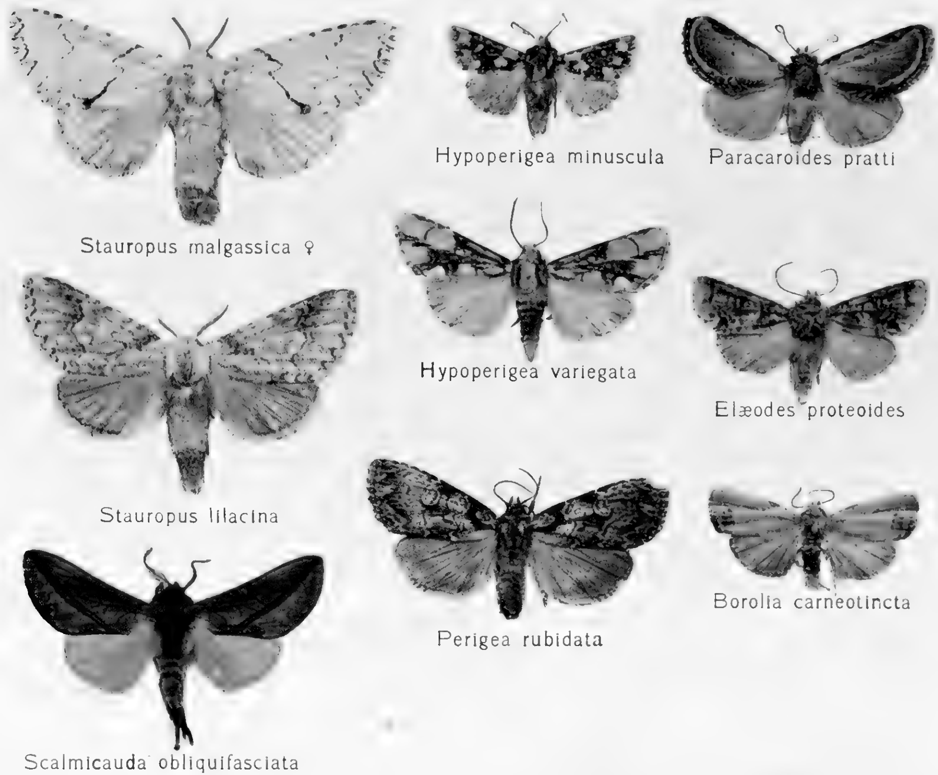
♀. Nigra; flagello, pronoto, callis humeralibus, scutello angulis anticis, postscutelloque fascia transversa flavis; mandibulis apice excepto, tegulis, segmentis dorsalibus secundo dimidio basali, sextoque, ventralibus primo, secundo dimidio basali, quinto, sextoque, pedibusque ferrugineis; alis hyalinis, leviter infuscatis, venis fuscis.

Long. 11 mm.

♀. Mandibles tridentate at the apex; clypeus porrect, triangularly emarginate at the apex, not carinate, clothed with silver pubescence. Eyes with very large facets in front, separated at the base of the clypeus by a distance equal to the length of the second joint of the flagellum, a groove along the inner margin of the eyes near the summit. Second joint of the flagellum nearly as long as the first and third combined. Head large and massive, broader than the thorax, minutely and closely punctured, the temples very broad and clothed with silver pubescence; ocelli in a wide triangle, the posterior pair as far from each other as from the eyes, fully half as far again from the posterior margin of the head as from each other. Pronotum transverse, rounded at the anterior angles; mesonotum very finely punctured-rugulose on the anterior half, more sparsely punctured posteriorly, a broad depression from the anterior margin to the middle. Scutellum and postscutellum shining, with scattered punctures; propleurae vertically striated; mesopleurae sparsely and rather coarsely punctured, without a groove for the intermediate or hind femora. Median segment closely and rather strongly punctured, the triangular basal area defined by grooves and with a median longitudinal groove, the sides of the segment closely and rather strongly obliquely striated. Abdomen petiolate, smooth and shining, the first segment longer than the second and third combined, slender, the apical half moderately swollen, not constricted at the apex; second segment nearly as broad at the apex as the third, the second ventral segment with a small, oblong, pubescent, opaque mark on each side near the base; fifth dorsal segment minutely punctured; pygidial area very narrow, lanceolate. Recurrent nervure received just beyond three-quarters from the apex of the cubital cell; transverse cubital nervure received close to the middle of the radial cell. Hind tibiae serrate.

Hab. Fiji, Natova (*R. Veitch*), April.

The petiolate abdomen gives this insect somewhat the appearance of a *Dasyproctus*, but it does not belong to that genus, but does not seem to be closely allied to any described *Crabro*.



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NEW HETEROCERA FROM MADAGASCAR.

III. *New or little-known* Heterocera *from Madagascar.* By Sir Geo. H. Kenrick, F.E.S.

[Read May 2nd, 1917.]

Plates I–VI.

In continuation of a paper read before the Society on November 5th, 1913, I now submit a further list of insects taken in Madagascar by Mr. Felix B. Pratt in 1910.

There still remain the *Geometridae* to be described, and among them there appear to be many interesting forms.

I have again to thank Sir George Hampson and his assistants for their very kind help in the work of identification.

I wish that it had been possible to compare the insects with types to be found in Continental cabinets before publishing these descriptions, but as that is out of the question for the present, I let these go out as they are.

NOTODONTIDAE.

Stauropus malgassica, sp. n. Plate I.

Head, thorax, base and shaft of antennae, upper part of palpi white; base of palpi and fringes round eyes dark brown; antennae chestnut; legs white, tarsi blackish; abdomen, base and last two segments white, remainder grey. *Fore-wing* white; an oblique basal black line from costa to cell; followed by an antemedian black line, oblique with strong angulation in the cell, and a thickening at inner margin, which in the female develops into a round spot; the median line is faint and not visible beyond the middle of the cell; the postmedian line has three distinct angulations and the subterminal is composed of 6 V-shaped marks; there are 4 dark dots on the costa beyond the postmedian line. *Hind-wing* white, slightly fuscous towards the inner margin, with a dark subterminal line. Exp. 50 mm.

Stauropus lilacina, sp. n. Plate I.

Head, thorax, and legs pale grey; tibiae darker, antennae dark brown, abdomen grey, the two last segments lighter. *Fore-wing* pale grey suffused with lilac with dark brown lines; basal line oblique and diffused, antemedian line oblique and angulated; median line faint and interrupted; postmedian double, angulated, and not very oblique; in the female with a round spot just before the inner margin; subterminal line composed of 6 V-shaped markings; a more or less pronounced dark shade beyond the antemedian line, most conspicuous towards costa. *Hind-wing* dark grey, fringes pale. Exp. 50 mm.

Scalmicauda obliquifasciata, sp. n. Plate I.

Head and legs reddish brown, palpi paler, antennae and collar dark brown; thorax above pinkish; abdomen dark at the base, then ochreous, but tuft blackish. *Fore-wing* pinkish brown, with a brownish cloud, more or less intense, from cell to costa; a fine double line from middle of inner margin to apex; an irregular dark brown transverse line at base, reaching half across wing, followed by an angulated antemedian line; the 3 stigmata are of the ground-colour, but outlined by fine dark lines fringes dark. *Hind-wing* pale straw-colour with fringes concolorous. Exp. 44 mm.

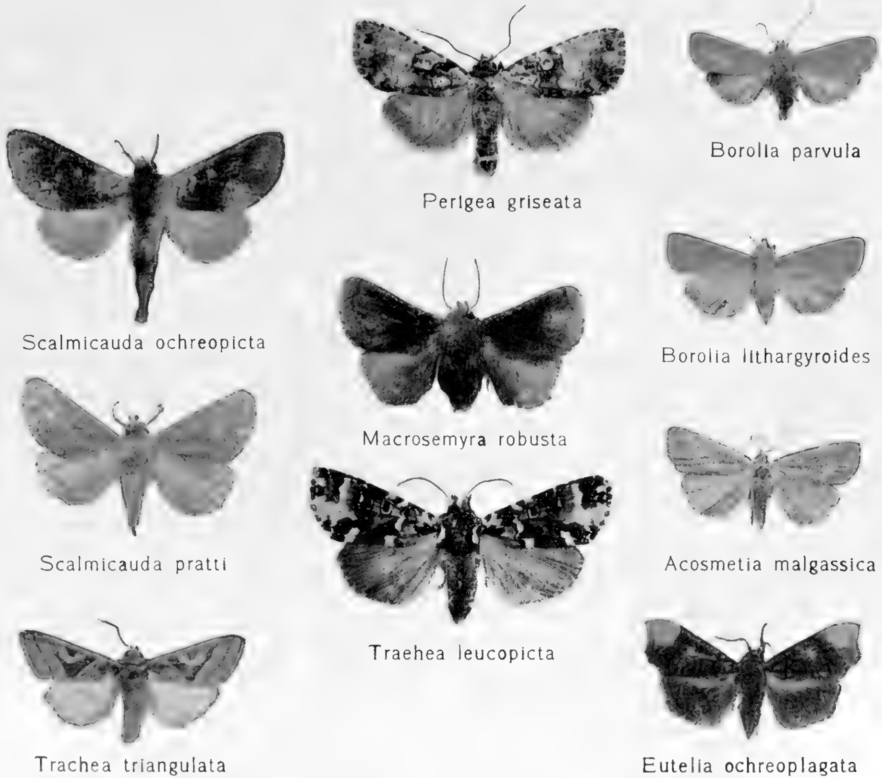
Varies a good deal in intensity of colour, and the stigmata in some specimens are more or less black.

Scalmicauda ochreopicta, sp. n. Plate II.

Somewhat like the foregoing, but has no oblique line; the stigmata are barely discernible, and in most specimens the area at base of wing and at the angle is spotted with pale ochreous. *Hind-wing* much darker than in the preceding species. Exp. 40 mm.

Scalmicauda pratti, sp. n. Plate II.

Head, legs, palpi, and thorax reddish brown, shaft of antennae pale; abdomen reddish brown, paler beneath, tuft of the same colour. *Fore-wing* reddish brown, mottled with pale ochreous, which forms a patch extending from cell to near apex; a black spot at base of wing, and a whitish horizontal line extending from base to near middle of inner margin, where it meets an irregular transverse pale line extending to costa; a black streak at end of cell, and a pale postmedian waved line with dark border; 8 black dots form a subterminal line, and a pale line precedes the margin. *Hind-wing* reddish ochreous. Exp. 34 mm.



Andre Sleigh & Anglo Ltd

NEW HETEROCERA FROM MADAGASCAR.

NOCTUIDAE.

Trachea triangulata, sp. n. Plate II.

Head, legs, palpi, and thorax pinkish ochreous, a pale line at base of collar; abdomen ochreous at base and then pinkish. *Fore-wing* pale pinkish brown, with a conspicuous triangle having its apex on inner margin, and of a dark chestnut colour; inside the base of the triangle is a semicircular band of the ground-colour. The triangular marking is edged with a fine pink line, and there is a straight subterminal line. *Hind-wing* whitish ochreous, fringes of both wings pinkish. Exp. 30 mm.

Daseochaeta malgassica, sp. n. Plate IV.

Head, legs, palpi, and thorax apple-green with black markings, antennae pale brown; abdomen blackish with pale green tufts, the last segment bright green. *Fore-wing* apple-green, with 7 or 8 black spots on costa, a black basal patch and antemedian, median, and postmedian interrupted black lines, the latter connected above the inner margin by a black dash to the subterminal line, which is outwardly bordered by a silvery white line; there are also black dashes along the inner margin, and a row of black dots on the hind margin. *Hind-wing* uniformly smoky with two transverse darker striae, fringes paler. Exp. 42 mm.

Hypoperigea minuscula, sp. n. Plate I.

Head, legs, and palpi ochreous with a pink tinge, antennae dark brown; thorax ochreous with scattered black scales; abdomen ochreous with a smoky tinge. *Fore-wing* dark brown with ochreous spots, the whole suffused with a faint purple gloss; a dark basal line is followed by two ochreous blotches and then an antemedian line; the postmedian line is parallel with the hind margin, and between them are three ochreous blotches, besides a small one at end of cell; both inner and hind margins have ochreous patches on them. *Hind-wing* uniformly smoky, fringes paler. Exp. 36 mm.

Hypoperigea variegata, sp. n. Plate I.

Head and palpi reddish ochreous; antennae pale brown; legs ochreous with dark rings on tarsi; thorax whitish above, patagia dark; abdomen dark ochreous paler between segments. *Fore-wing* dark yellowish grey, with pale ochreous blotches; a whitish spot at base, with indications of a dark basal line; an interrupted black antemedian line, and a curved and angulated postmedian line; the stigmata outlined with black, and the reniform filled with white and continued beyond, making a large round spot. There are two pale blotches on the inner margin, and two on the hind margin, with a dark streak between them. *Hind-wing* very pale with dusky margin, fringes pale. Exp. 40 mm.

Perigea rubidata, sp. n. Plate I.

Head, antennae, palpi, and legs reddish, the tarsi ringed with darker, collar dark with whitish crest; thorax and patagia dark with whitish scales; abdomen reddish brown with darker crests and yellowish tuft. *Fore-wing* dark brown suffused with pink, costa broadly covered with whitish scales; a conspicuous curved central streak from base to costa very dark, and a dark spot on costa beyond end of cell. The stigmata are pale, but the claviform has a dark streak in it; there is an indistinct pale subterminal line, and some dark streaks before the hind margin. *Hind-wing* reddish brown. Exp. 42 mm.

Perigea griseata, sp. n. Plate II.

Head, antennae, palpi, and legs reddish, the tarsi ringed with darker; collar dark brown, patagia pale ochreous; abdomen yellowish ochreous, crests not developed. *Fore-wing* whitish ochreous, the stigmata, which are large, outlined with black, with a black space between them; an antemedian line starting from near base on costa curves outward to inner margin; a postmedian line is nearly straight, the space between these is filled in with dark blackish-brown; there is a waved and interrupted subterminal line, and some dark streaks near it. *Hind-wing* uniformly ochreous, fringes paler. Exp. 38 mm.

Macrosemyra robusta, sp. n. Plate II.

Near to *M. tenebrosa*, Butl., but the wings are squarer, and the insect decidedly stouter. Head, legs, palpi, and antennae brown; thorax and abdomen darker and shaggy. *Fore-wing* with scales slightly raised, giving them a rough appearance, dark brown, but the costa bright brown, especially underneath; indications of the beginning of a dark antemedian line on costa, and a stronger dark subterminal line begins on the costa before the apex and is continued to vein 4. *Hind-wing* uniformly dusky, fringes rather paler. Exp. 36 mm. One ♂.

Borolia carneotincta, sp. n. Plate I.

Antennae of male ciliated. Head, palpi, legs, and collar yellowish-ochreous, antennae darker; patagia ochreous, abdomen smoky, tuft ochreous. *Fore-wing* yellowish olive suffused with pink, divided longitudinally into three folds, the costa and edge of second fold pale pink; indications of a dark first line; a triangular olive blotch midway along costa, a black dot on vein 5 forming part of a postmedian line; the hind margin is broadly suffused with fuscous, and there are a few black subterminal points. *Hind-wing* greyish with faint dark lunule, fringes paler. Exp. 30 mm.

Borolia parvula, sp. n. Plate II.

Antennae of male nearly simple. Head, palpi, legs, antennae and thorax reddish ochreous, abdomen rather darker. *Fore-wing* reddish ochreous, with veins paler, but rather more colour in the cell; a short dark streak from the base under the cell, two or three dark specks along the costa indicating a postmedian line, a small black dot below the middle of the cell, and another more conspicuous two-thirds along the inner margin from the base. *Hind-wing* of male pale ochreous, of female pale grey. Exp. 26 mm.

Borolia lithargyroides, sp. n. Plate II.

Head, thorax, palpi, antennae, and legs pinkish ochreous, abdomen less pink. *Fore-wing* pinkish ochreous, with a central shade and a triangular shade below apex; on the central shade at the end of the cell is a short white longitudinal streak, and above this a black dot; both antemedian and postmedian lines are represented by a few black dots, and the subterminal line by a complete row. *Hind-wing* grey, fringes pinkish. Exp. 28 mm. One ♀.

Acosmetia malgassica, sp. n. Plate II.

Head, legs, antennae and palpi greyish brown; thorax grey, the collar divided into two prominences; abdomen greyish ochreous. *Fore-wing* dark grey with a purplish gloss; indications of ante- and post-median lines, subterminal line paler. *Hind-wing* pale grey. Underside whitish, thickly irrorated with grey. Exp. 28 mm.

Paracaroides pratti, sp. n. Plate I.

Head, antennae, palpi, and legs chestnut; thorax darker, but with patagia paler; abdomen yellowish ochreous. *Fore-wing*: the disc is sparsely covered with scales, while the margins have a thicker coat so as to appear decidedly raised; pale ochreous, darker towards margin, the costa chestnut, with a few white scales; the inner and hind margins have a pale band, followed by one nearly black; there are two small dark dots at end of cell; fringes purplish.

Hind-wing ochreous, darker round the margins, fringes pale. Exp. 38 mm.

Trachea leucopicta, sp. n. Plate II.

This species falls among the section in which the males have lateral tufts of hair on the abdomen.

Head, palpi, and legs black, with white spots, antennae chestnut; thorax black with a dorsal white streak, and white on the patagia and back of collar; abdomen ochreous, inclined to fuscous above, the crests darker, tipped with white. *Fore-wing* black, with white markings, the median area partly suffused with lilac, an irregular three-lobed white blotch at base; the antemedian line white, angulated, and running into a square white spot on inner margin; the orbicular and reniform stigmata black with white margins. A large white blotch fills the remainder of the wing beyond the postmedian line, but it is interrupted by a square patch of black at the apex, with two white spots in it, and by an irregular black patch at anal angle which is connected to the central area. *Hind-wing* fuscous, but whitish at anal angle. Exp. 40 mm.

Elaeodes proteoides, sp. n. Plate I.

Head, palpi, antennae, and collar, pale pinkish ochreous; legs the same colour, with tarsi ringed with darker, the long hairs on tibiae paler. *Fore-wing* greenish with purple blotches; antemedian and postmedian lines pale with darker margins; reniform and orbicular stigmata with some pink and darker markings, outlined by a pale line; a row of subterminal black dashes, fringes spotted. *Hind-wing* brownish with pale fringe, and paler at the base; a faintly darker lunule and on the underside a dark stria. Exp. 32 mm.

Hypocalymnia gloriosa, sp. n. Plate IV.

The venation of the hind-wing does not agree with Hampson's figure, p. 186, in this insect there is a distinct vein 5 from just above the lower angle of cell. Head and thorax greyish ochreous, legs, antennae, and palpi reddish ochreous. *Fore-wing* coppery shot with purple; an angulated pale stripe starting from thorax below costa reaches to inner margin, and turns at the hind margin, gradually becoming narrower; it is bordered on the outside by a chestnut semicircular line; the orbicular and reniform stigmata are of the same colour, and towards the hind margin on the disc are two small dark dashes. *Hind-wing* and fringes pale ochreous. Exp. 40 mm.

Stictoptera pectinata, sp. n. Plate IV.

If this insect does not constitute a distinct genus it should be placed in a separate division on account of the strongly pectinate antennae of the male, and the square-shaped wings; in other respects it follows the genus.

Head and terminal joint of palpi ochreous; legs, antennae and second joint of palpi rather darker; collar reddish ochreous, patagia purplish brown; abdomen dark grey with pale tuft. *Fore-wing* dark marbled with grey, green, purple and brown; basal line dark, margined with paler extending to cell; antemedian obscurely double, greenish; median line sharp and dark, but not extending to inner margin; postmedian line dark, angulated, and interrupted, followed by two brown blotches and a brown subterminal line. *Hind-wing* dark grey, subhyaline at base. What I take to be the female has plain antennae, and the patagia and basal half of fore-wing, together with a postmedian area pale grey. Exp. 31 mm.

Eutelia aureopicta, sp. n. Plate IV

Head, antennae, legs, and palpi pinkish grey; thorax and crests of abdomen coppery bronze, abdomen pinkish grey. *Fore-wing* bronze, with grey lines and chocolate blotches; basal line ill defined, followed by three chocolate patches; an antemedian angulated whitish line; the orbicular, a dark dot outlined with white; the reniform large, oblique, outlined with white, with a dark edging of chocolate on the inner side; three ill-defined chocolate patches on the hind margin, and traces of a double white subterminal line; before the middle patch is an oblique golden spot, followed by a minute dot of same colour. *Hind-wing* whitish, with a broad fuscous margin. Underside grey, with reddish suffusion towards the margins, and a white spot on costa before the apex. Exp. 30 mm.

Eutelia ochreoplagata, sp. n. Plate II.

Head, legs, antennae, and palpi dark fuscous; abdomen without crests, dark fuscous. *Fore-wing* purplish grey, with lines much darker; basal line broad, antemedian line double, one portion joining with central line on inner margin; the postmedian line angulated below costa, and preceded by a slightly paler patch; beyond this the apex becomes abruptly pale ochreous, and penetrating half of this patch is the subterminal line, consisting of six dark brown connected spots. *Hind-wing* purplish grey, inclining to ochreous at base, with three angulated transverse lines, the outermost dark brown, fringes dark. Underside fuscous, pale at the base, the apical patch dark yellow. Exp. 33 mm.

Phlegetonia pratti, sp. n. Plate III.

Near to *artipars*, but the male has the tibiae very heavily fringed with hairs, and the markings are somewhat different.

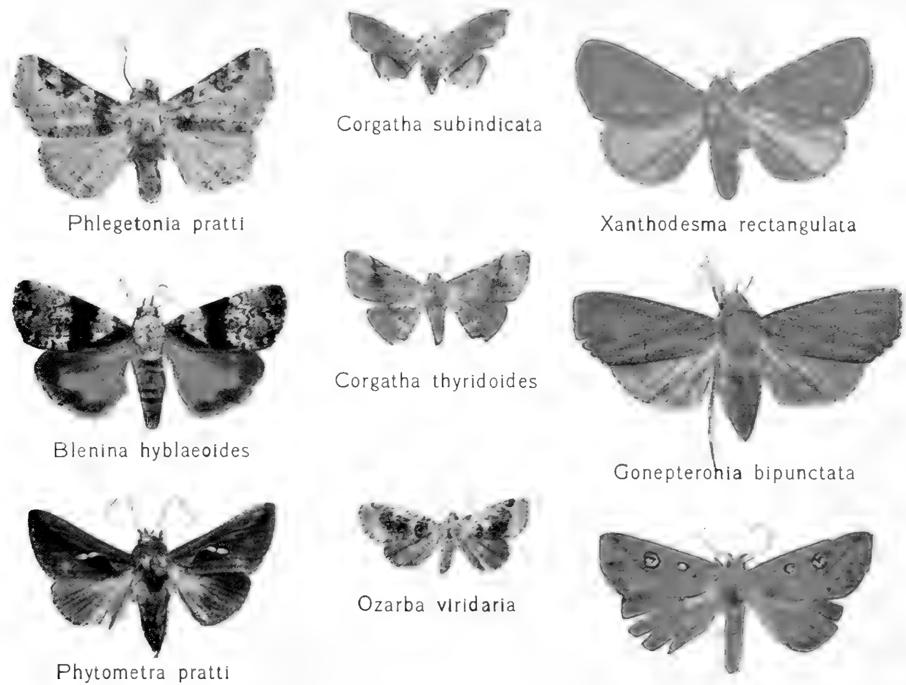
Head, palpi, legs and thorax entirely pale ochreous, antennae reddish ochreous; abdomen ochreous with darker crests. *Fore-wing* pale ochreous, with a faint purplish gloss and dark blotches; basal line indicated by a dark dot on the costa, the antemedian is a dark and sinuous line in the middle of a brown transverse blotch; there is a dark central spot, and a fine indistinct median line, followed by two others nearly parallel; the postmedian is a fine dark line, inwardly angled below cell and on vein 2; on its inner side near the costa is a pale blotch, surrounded by a dark triangular patch on costa in which are three pale costal dots; the subterminal line is fine and black, and there is a round dark dot near the angle on inner margin. In the female the whole wing is darker, and the markings are obscured by a dark grey central band. *Hind-wing* pale ochreous, with numerous striae and a double dark line from anal angle to middle of wing, subterminal line very fine and black. Exp. 40 mm.

Blenina hyblaeoides, sp. n. Plate III.

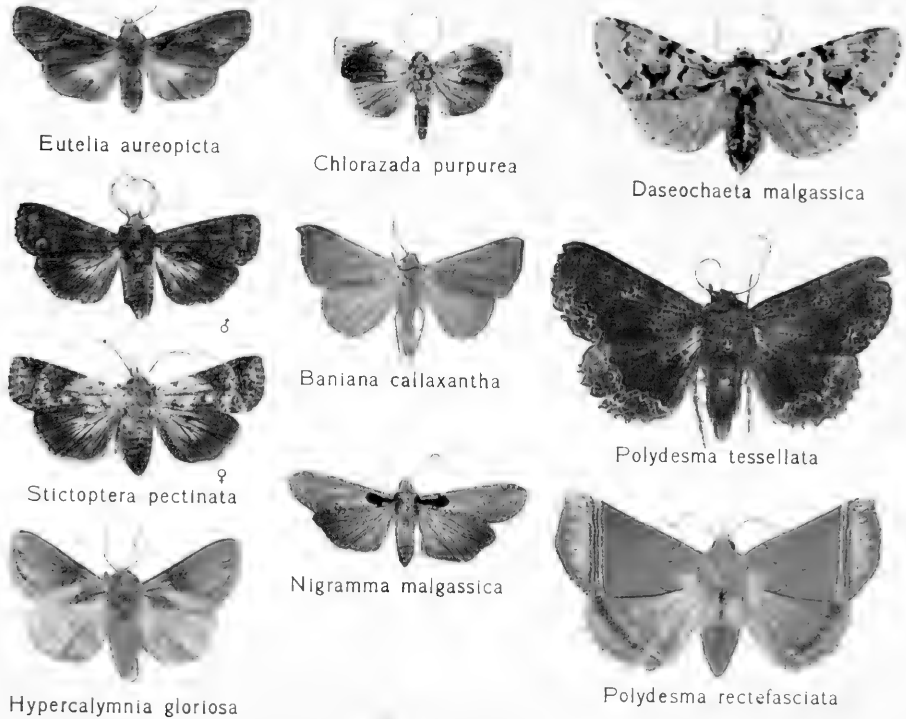
Palpi with second and third joint well developed; termen of hind-wing very slightly excised. Head, palpi, thorax and legs greenish grey, tarsi ringed with black, antennae dark; abdomen blackish above, with orange margins to the segments, ochreous below. *Fore-wing* greenish grey with faint pink reflections; first line black, joining a black basal streak; antemedian line oblique and angulated; three black dots at end of cell, followed by a much angulated postmedian black line, edged outwardly with paler; beyond this are some irregular dark brown tooth-shaped markings forming a subterminal line. *Hind-wing* orange, with broad fuscous margin and orange fringes; in one specimen there is a wide black transverse band quite absent in the other. Underside fore-wing fuscous, with paler costal band, interrupted by dark central spot. *Hind-wing* orange with dark marginal band. Exp. 33 mm.

Chlorozada purpurea, sp. n. Plate IV.

The position of vein 7 in the fore-wing differs from the type in leaving vein 8 beyond the end of the cell, but this is hardly sufficient for the creation of a special genus.



NEW HETEROCERA FROM MADAGASCAR.



New Heterocera from Madagascar.

Antennae and palpi brown, head and patagia pale olive; legs white, abdomen and thorax purplish grey, paler below. *Fore-wing* whitish, with a purple cloud occupying the centre of the wing, and leaving a narrow pale external margin; traces of a dark basal blotch edged with white externally; a sinuous fine white antemedian line edged with darker; two dark dots in the central area, followed by an oblique fine white angulated postmedian line; the subterminal line takes the form of six dark dots on the pale apical area; there is a dark terminal line extending half way down the wing; fringes pink. *Hind-wing* uniformly grey, with pale fringes. Exp. 26 mm.

Polydesma rectefasciata, sp. n. Plate IV.

Head and thorax fawn-colour; antennae, legs, and palpi dark brown with numerous pale grey hairs; abdomen fawn-colour above, the crests darker, paler below. *Fore-wing* hind-margin subangular, fawn-colour; antemedian line whitish edged with darker, much angulated and interrupted; stigmata represented by three minute dots, dark, edged with paler; from just before the angle to the costa there is a group of fine lines, nearly straight; the first is white, the second dark, the third pink, the fourth wider and dark brown, the fifth pale ochreous, forked at the top and expanding into an apical patch in which are two dark dots; beyond these lines there is a broad pink area. *Hind-wing* yellowish, broadly margined with fuscous, but again yellowish at the outer margin; a few whitish dots at the angle. Underside uniformly whitish thickly irrorated with black, a black transverse stria and central dot in both wings. Exp. 42 mm.

Polydesma tessellata, sp. n. Plate IV.

Antennae, head, and thorax dark brown, palpi brown outside and ochreous inside; abdomen dark brown above, ochreous beneath, legs ochreous. *Fore-wing* brown with violet shade, the costa with a series of dark brown spots; a basal patch of ochreous irrorated with black, followed by an irregular double violet line; an indistinct dark median line and a strongly marked dark postmedian line; the reniform stigma outlined with a pale line, and with internal lunule; the subterminal line much angulated, double, and whitish, followed by a series of dark marks outlined with paler, and a thin terminal pale line, fringes rather paler. *Hind-wing* similar to fore-wing, the pattern of the outer portion forming a continuation of the pattern of the fore-wing. Underside ochreous, with lunules, and a curved postmedian line in both wings; a row of black dots along the margin. Exp. 50 mm.

Baniana callaxantha. Plate IV.

After describing and figuring this insect, it was identified with *Baniana callaxantha*, Holl., but the figure could not be withdrawn.

Phytometra pratti, sp. n. Plate III.

Head, antennae, palpi, and legs smoky grey, thorax and abdomen rather paler. *Fore-wing* dark grey, with coppery reflections on the disc. Neither lines nor stigmata are visible, but there is a fine silvery line from inner margin near the base extending obliquely upwards to the cell, where it turns outward to form a silvery oblong spot, in continuation of which, but quite distinct is a second silvery oval spot. *Hind-wing* ochreous-grey. Exp. 40 mm.

Nigramma malgassica, sp. n. Plate IV.

Head, antennae, palpi, and legs, reddish ochreous; tegulae ochreous, with two darker transverse bands, patagia dark brown; abdomen reddish grey. *Fore-wing* pale ochreous clouded with reddish; a conspicuous oval basal blotch, edged with paler and not reaching either to the costa or inner margin; there is an antemedian darker fine line, not very distinct, and a similar postmedian line and three dark dots at end of cell; on the inner margin there is a pale dot near the anal angle, and at the angle another pale dot, from which extends upwards a pale subterminal line; on either side of this is a row of black dots. *Hind-wing* uniformly dark grey, fringes paler. Exp. 34 mm.

Corgatha subindicata, sp. n. Plate III.

Head and thorax pale ochreous, palpi, antennae, and legs reddish brown; abdomen pale at the base, but darker on the remaining segments. *Fore-wing* pale ochreous, clouded with brownish grey; antemedian line whitish, slightly angulated at cell, and edged with darker; central shade oblique, straight, and brown, reniform stigma indicated by a white margin; postmedian white, angled outwards below costa and oblique, terminating in the middle of inner margin; a fine interrupted subterminal line extends from below vein 2 to vein 5; beyond this is a distinct pale patch, followed by an angulated brown marginal line. *Hind-wing* pale ochreous, with two oblique dark lines, the outer one margined with white, and beyond this are a few dark dots, fringes pale brown. The underside of both wings much darker than the upper, and the hind-wing has a well-defined dark margin. The angle of the hind-wing is strongly crenulated, possibly a sexual development. Exp. 26 mm.

Corgatha thyridoides, sp. n. Plate III.

Head, palpi, antennae, and thorax reddish ochreous; legs reddish ochreous with the tarsi paler; abdomen reddish above, paler beneath. *Fore-wing* pale ochreous with reddish irrorations; basal line darker, extending from costa to middle of cell; a dark angulated antemedian line, followed by a dark central dot, and this again by an outwardly angled median dark line, beyond which the reniform stigma is outlined with darker; the postmedian line is strongly angled outwards at costa, and then continued obliquely to middle of inner margin; beyond this is a diffused reddish band, after which the wing is paler, with the subterminal line indicated by three black dots; in the apex there is an indistinct marginal row of dots. *Hind-wing* dull red, slightly ochreous at the base, with two transverse dark lines beyond which is a paler patch with some grey in it; the anal angle of the wing is strongly crenulate, as in *subindicata.* Underside paler, with similar markings. Exp. 28 mm.

This insect is figured by Saalmuller, but neither named nor described.

Ozarba viridaria, sp. n. Plate III.

Head and thorax ochreous, with a faint reddish tinge; antennae, legs, and palpi rather darker; abdomen pinkish ochreous. *Fore-wing* dark grey, marbled with green with whitish lines; basal line indicated by dark dots on costa; an outwardly curved whitish antemedian line; the reniform stigma pale margined with darker; the postmedian line whitish, strongly outwardly curved at costa and margined on both sides with darker; beyond this the wing is whitish ochreous, with a half round dark spot on costa before apex and a grey cloud, with a few black terminal dots, before the hind margin. *Hind-wing* uniformly grey with paler fringes. Exp. 26 mm.

Gonepteronia bipunctata, sp. n. Plate III.

Head, palpi, antennae, and legs dull reddish ochreous, tarsi ringed with white. *Fore-wing* dull reddish, minutely irrorated with ochreous; lines darker, antemedian angulated, sloping outwards from costa, median line nearly vertical, not reaching above reniform stigma; postmedian line much angulated from costa to vein 3, then turning inwards abruptly and meeting the median line; subterminal line faintly indicated, pale ochreous and much angulated; the orbicular stigma a minute white dot, and a similar white dot at the top of the reniform stigma; fringes reddish. *Hind-wing* uniformly greyish ochreous, fringes paler. Exp. 48 mm.

Xanthodesma rectangulata, sp. n. Plate III.

Head, antennae, palpi, legs, and thorax ochreous-orange, abdomen dull yellowish. *Fore-wing* dull orange, the veins all dark brown; a short dark basal line, a straight antemedian line sloping outward from costa, a postmedian line, strongly angulated on vein 6; from the middle of this a short line extends to the reniform stigma; the subterminal line is curved, and is followed by a distinct terminal line. *Hind-wing* uniformly dull yellow; fringes of fore-wing, orange of hind-wing dull yellow. Underside uniformly dull yellow. Exp. 44 mm.

DELTOIDAE.

Singara albomacula, sp. n. Plate III.

Palpi well above vertex, second joint thickly scaled, third joint bare and sharp; antennae bipectinated, tibiae spurred; veins 3 and 4 from end of cell, 5 from just above, 6 and 7 from upper end of cell; costa nearly straight, hind margin rounded. Head, thorax, and patagia orange; palpi orange outside and paler inside; legs ochreous, antennae pale brown. *Fore-wing* orange irrorated with darker; a basal dark patch, followed by an antemedian line curved inwards, a dark oblique streak from apex to middle of inner margin; the orbicular a conspicuous white dot with dark margin; the reniform also white, with dark margin and dark centre. *Hind-wing* ochreous, the outer portion inclined to orange; a narrow median line extending to vein 3, fringes narrow, orange. Underside ochreous, the fore-wing with three dark spots, and the hind-wing with dark central lunule. Exp. 40 mm.

PYRALIDAE.

Acara pratti, sp. n. Plate V.

I cannot distinguish any generic character to separate this species from the genus, but the hind-wing is squarer than in *morosella*, and vein 2 of hind-wing is not present as shown in the figure,* but this is not mentioned in the description.

Head, legs, and antennae reddish brown; thorax rather brighter, palpi in female darker; abdomen shining ochreous with reddish suffusion. *Fore-wing* uniformly reddish ochreous, the costa clothed with ochreous scales, and many transverse bars of the same. *Hind-wing* yellowish ochreous without markings. Exp. ♂ 50, ♀ 70 mm.

Macalla malgassica, sp. n. Plate VI.

Somewhat like a small species from Natal.

Head white, antennae, palpi and legs dark grey; thorax dark, with collar and patagia grey; abdomen ochreous. *Fore-wing* pale grey, with darker markings; an antemedian and postmedian line indicated by dark dots, a darker patch in the cell; subterminal line a series of dark dashes, fringes grey. *Hind-wing* ochreous. Exp. 24 mm.

TAENIAPHORA, gen. nov. (Sub-family *Epipaschianae*).

Palpi porrect, extending twice the length of the head, second joint fringed with hair above and below, third joint long and naked. Antennae of both sexes pectinated, but simple at the tip; tibiae with fairly long spines. *Fore-wing* vein 6 from end of cell, 7, 8, and 9 stalked. *Hind-wing* 3, 4, and 5 from end of cell; median nervure not pectinated; no raised scales below the cell on the upper side, but on the underside of the fore-wing the scales in the cell are crowded together, and slightly raised; the longitudinal fold below the cell in the fore-wing in the male has no scales, but a number of vertical striae; in the female the scales are normal.

Taeniaphora submarginata, sp. n. Plate V.

Palpi and antennae pale ochreous; legs the same, with reddish hairs on the tibiae; thorax and patagia reddish ochreous, abdomen paler. *Fore-wing* pale ochreous with fuscous inner and hind margin; at the base of the costa is a blackish shade, followed by two dark spots; fringe ochreous spotted with reddish; at the end of the cell is a conspicuous black dot, and beyond this a series of fine black triangular marks margined outwardly with paler. *Hind-wing* pale ochreous, with a thin black marginal line and pale fringe. Underside pale, broadly margined on the costa of both wings with reddish, and with a dark spot at the end of cell in both wings. Exp. 50 mm.

* Hampson's Moths of India.

Sindris leucomelas, sp. n. Plate VI.

Head, legs, antennae and palpi olive, patagia the same; thorax and abdomen orange. *Fore-wing* olive suffused with orange, and with three distinct white blotches, one roundish on hind margin; one in the middle of the wing, rounded towards the body, but forming a broad lateral stripe outwardly; one at apex just joining the last, and with three pointed teeth on the outside; fringes ochreous. *Hind-wing* uniformly golden. Exp. 38 mm.

LOPHOCERA, gen. nov. (Sub-family *Pyralinae*).

Palpi upturned, the third joint well developed and acute, proboscis present; antennae pectinated in the male, with a bunch of long hairs about the middle; venation. *Fore-wing* 3, 4, and 5 from lower end of cell, 6 from upper end, 7, 8, 9, stalked. *Hind-wing* 6 from end of cell, 7 anastomosing with 8.

Lophocera flavipuncta, sp. n. Plate VI.

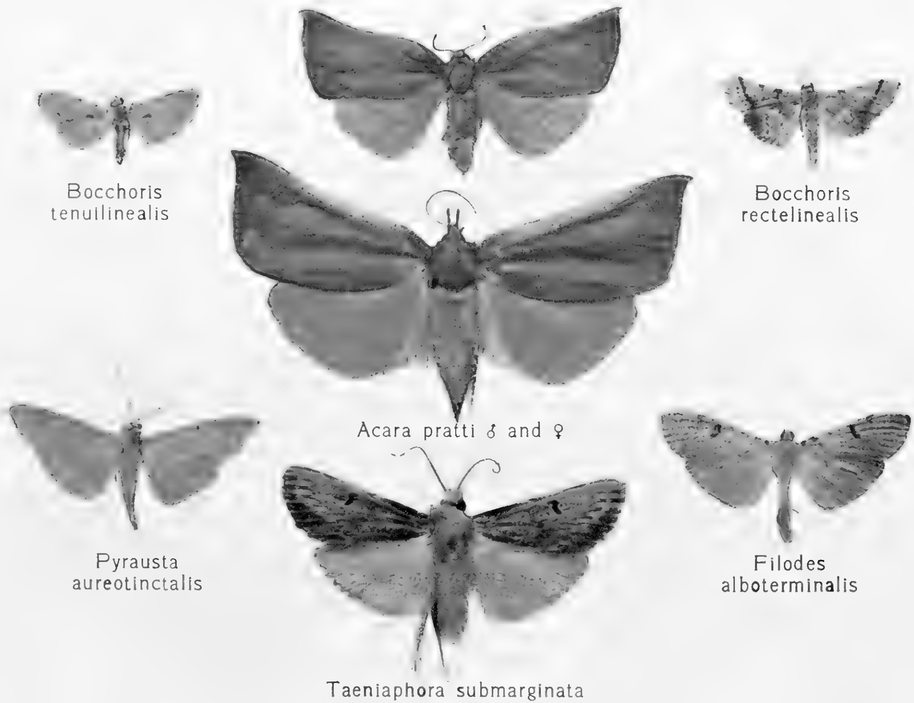
Head, legs, palpi, and thorax black, patagia and collar orange, abdomen orange, tuft black. *Fore-wing* black, with a large yellow oblique spot beyond the end of the cell. *Hind-wing* orange with broad black border. Underside similar. Exp. ♂ 34 mm., ♀ 30 mm.

Filodes alboterminalis, sp. n. Plate V.

Palpi, head, antennae, and legs ochreous; antennae barely the length of the fore-wing; patagia of male long and darker; abdomen golden above, paler beneath, tuft conspicuously white. *Fore-wing* ochreous with golden suffusion; a dark spot at base of costa, a dark antemedian line curved outwards; a conspicuous oblong, lunulated, oblique dark spot at end of cell; a postmedian angulated dark line thickest at costa; beyond this the wing is greyish; in some specimens a dark dot in the cell. *Hind-wing* with central spot. Exp. 36 mm.

Filodes grisealis, sp. n. Plate VI.

Head, palpi, antennae, thorax, and abdomen dark grey; legs and underside silvery white. *Fore-wing* dark grey, with slight tinge of purple; the antemedian line central shade, and postmedian line more or less distinctly divide the area into four nearly equal portions; in the cell is a dark spot, and a darker mark at the end of the cell. *Hind-wing* with central spot and transverse line



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NEW HETEROCERA FROM MADAGASCAR.

rather indistinct; these markings are clearer on the underside. Exp. 32 mm. One ♀.

Bocchoris rectilinealis, sp. n. Plate V.

Head, antennae, and palpi pale ochreous; pectus and legs silvery white; thorax ochreous with two dark spots on collar; abdomen with a golden tinge, tuft paler. *Fore-wing* ochreous suffused with pale lilac, the costa paler; an indistinct dark basal line, an angulated, broad dark antemedian line, a faint dark mark at end of cell; a broad dark nearly straight oblique postmedian line, followed by a much fainter thin parallel line. *Hind-wing* pale with dark central spot, angulated dark line and broad dark border, strongest at apex; a fine subterminal pale line, fringes darker. Exp. 24 mm.

Bocchoris tenuilinealis, sp. n. Plate V.

Head, palpi, and legs pale ochreous, antennae pale brown; thorax and abdomen whitish. *Fore-wing* semi-hyaline with golden sheen, the veins showing dark; a dark basal spot, a straight oblique antemedian line, the angle formed by it and the inner margin being darker, a very faint dot at end of cell, and a fine, dark, evenly curved postmedian line. *Hind-wing* pale at base, with an irregular darker lunule, and a fine curved median line, the veins darker; fringes pale golden. Exp. 23 mm.

Sylepta malgassica, sp. n. Plate VI.

Head and antennae ochreous, palpi, first joint white, second joint ochreous; legs pale ochreous and silvery; thorax and abdomen ochreous. *Fore-wing* grey, with gold and purple sheen; a whitish blotch at base extending to first line, which is dark; the cell itself is whitish, with dark spots at either end; beyond this is a strongly angulated dark line, followed at costa by a white blotch with two teeth; below the cell is another white blotch; at apex is a small dark streak. *Hind-wing* whitish, with dark lunule and angulated line, the margin widely bordered with fuscous. Exp. 26 mm.

Sylepta acutipennalis, sp. n. Plate VI.

Head dull orange, palpi darker, antennae pale brown; legs silvery, the tibiae of the median pair of legs with a long tuft of yellow hair tipped with darker; thorax, abdomen, and patagia pale brown, tuft blackish. *Fore-wing* pale brown with buff patches

—the two first in the cell, the third very small at end of cell, the fourth large, extending in triangular form from the costa to vein 4, and margined outside by a dark line. *Hind-wing* with two faint striae enclosing a paler space. Exp. 28 mm.

Glyphodes paramicalis, sp. n. Plate VI.

On comparing this insect with Swinhoe's description of *amicalis*, and the type of this and of *subamicalis* in the Natural History Museum, I am convinced that this is a different species.

Head, antennae, palpi, and legs whitish; thorax and abdomen fuscous brown, collar and patagia dove-colour. *Fore-wing* dark brown suffused with purple, with two semi-hyaline bands with violet reflections; the first band oblique, and sharply angulated on the outside; the second wide on the costa, and tapering to a point a little below the third vein; a faint pale dot at end of cell. *Hind-wing* similar, with one triangular transverse hyaline band bordered outside by a double oblique dark line, beyond which the disc has a greenish reflection; fringes pale, but not white. Exp. 36 mm.

Pyrausta aureotinctalis, sp. n. Plate V.

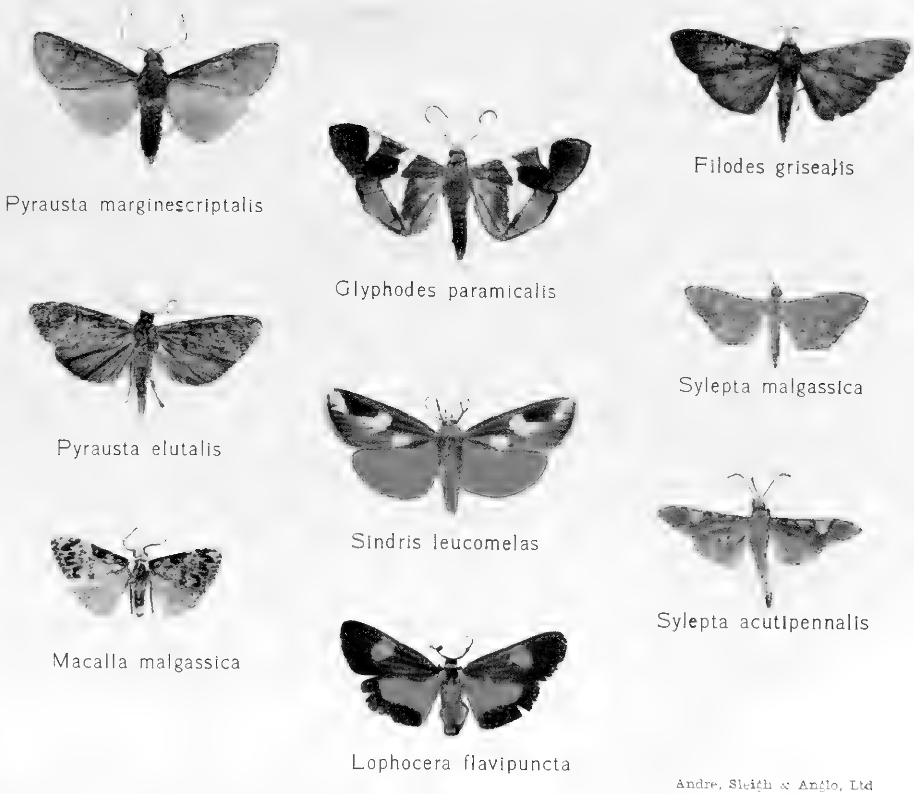
Head, antennae, and palpi pale brown, legs and underside of thorax white; thorax and abdomen orange, patagia canary-yellow. *Fore-wing* semi-hyaline with golden reflections; antemedian line indicated by two dark dots; a dark dot at end of cell, and two dots nearer to inner margin, the postmedian indicated by four faint dots. *Hind-wing* similar, with a row of dark marginal dots, fringes golden. Exp. 34 mm.

Pyrausta elutalis, sp. n. Plate VI.

Head, antennae, and palpi dark brown, legs paler, and the tarsi ringed with dark brown; thorax and patagia greenish grey; abdomen pale brown, tuft pale. *Fore-wing* greenish grey mottled with paler; a curved antemedian line darker, a sinuous median line, and a postmedian angulated line, curving outwards from the costa but not reaching the inner margin. *Hind-wing* pale brown without markings, fringes paler. Exp. 32 mm.

Pyrausta marginescriptalis, sp. n. Plate VI.

Head, palpi, and antennae dull red, legs red above, silvery below; thorax and abdomen above dull red, paler below, tuft pale. *Fore-*



NEW HETEROCERA FROM MADAGASCAR.

wing uniformly dull pink with brown irrorations; a few black scales obliquely placed indicate the antemedian line, and there is a dark mark at end of cell; the subterminal line is very distinct, consisting of fine black angulations. *Hind-wing* semi-hyaline and whitish, fringes of both wings pale. Exp. 34 mm.

IV. *Additions to the knowledge of the* Cetoniidae *of British India.* By Oliver E. Janson, F.E.S.

[Read February 7th, 1917.]

The basis of this contribution is an interesting and well-preserved series of Indian *Cetoniidae* collected by the late Captain R. Selous, and placed in my hands for identification by his brother, Dr. C. F. Selous, who has most generously allowed me to retain any of the specimens that I desired for my collection. A list of the species with the collector's notes that accompany them is given below, followed by a description of the very pretty new *Anatona* that he had the good fortune to discover.

I have taken this opportunity to describe three other new Indian species that have recently come into my possession from other sources, and of giving references to the additions that have been made to the family since the publication, in 1910, of the admirable volume by Mr. G. J. Arrow, on the *Cetoniidae* of the " Fauna of British India." I have also added some notes on a few errors and omissions in that work, and relative to the subject of this contribution.

List of the Cetoniidae collected by the Late Captain R. Selous.

1. *Anthracophora crucifera*, Oliv.

Mhow. " On grass, September 1905," one specimen.

A common and widely distributed species, but not hitherto recorded from Central India.

2. *Anatona selousi*, n. sp.

Mhow. " Found on Nil Gai dung, July 15th, 1905," one specimen.

Of this very distinct and pretty new species a single male example only was found by Capt. Selous.

3. *Aethiessa bagdadensis*, Burm.

Quetta. " Found flying and on the ground, March 11th, 1907," two specimens.

A rather scarce species, occurring in Armenia, Mesopotamia, Persia and Afghanistan, and already recorded by Arrow from Baluchistan.

4. *Protaetia* (*Potosia*) *impavida*, Jans.

Kashmir. "On flowering bush, July 1906," one specimen.

This species appears to be confined to the northern parts of India and is not common.

5. *Protaetia* (*Potosia*) *neglecta*, Hope.

Bandipur Nallah, Kashmir. "On flowering bushes, July and September 1906," three specimens.

A common and somewhat variable Indian species, with a range extending northwards to E. Turkestan.

6. *Protaetia* (*Eumimimetica*) *terrosa*, G. P.

Near Mhow. "July 27th, 1905," one specimen.

7. *Protaetia alboguttata*, Vigors.

Mhow. "On grass and flowering plants and flying to lamp, June to August, 1905," nine specimens.

A common and generally distributed Indian species extending into Ceylon, but not before recorded from Central India. Capt. Selous' series include blue, green and fine coppery-red varieties.

8. *Oxycetonia versicolor*, Fab.

Mhow. "On Date Palms, July 7th, 1905," two specimens.

Capt. Selous' specimens of this very variable and widely distributed species are the typical form (the "var. a" of Arrow), with a shining upper surface, and the prothorax and elytra extensively adorned with red.

9. *Chiloloba acuta*, Wied.

Mhow. "On grass, August and September 1905," four specimens.

10. *Epicometis hirtella*, Linn.

Quetta. "Eating Iris flowers, March and April 1907," nine specimens.

This species is an addition to the list of Indian *Cetoniidae*. The very closely allied *E. squalida*, Linn., is recorded by

Arrow from the same locality; both are common European species and of wide distribution, ranging through Asia Minor, Mesopotamia and western Persia to Baluchistan, where the Indian fauna assumes a very Palaearctic character. All Capt. Selous' specimens have a second white spot on the outer discal costa, a little before the middle of the elytra, that I do not find present in any of the many European examples that I have had an opportunity of examining.

Anatona selousi, n. sp.

♂ Body of an oval, compact and convex form. Castaneous, shining; base of head, the prothorax and elytra testaceous red, opaque, and with shining castaneous markings disposed as follows: On the prothorax a marginal band on each side, and eight small spots, viz. three placed in a nearly regular longitudinal row on each side of the disc and two in the middle (both prolonged anteriorly with a tendency to form a median stripe); on the scutellum an apical spot prolonged anteriorly; on each elytron eight spots, viz. one in the middle near the base, one near the suture and just before the middle, one about equidistant between the last and the apex and close to the suture, and four adjoining the outer margin, the first at the lateral sinus, the second and third (both small) behind the middle and the fourth close to the sutural angle. The pygidium and the sides of the prothorax, sternum and abdomen with irregular chalky-white markings. Head somewhat flattened between the eyes, coarsely and confluently punctured; clypeus long, narrowed in front, with a slight median carina and slightly produced and strongly reflexed angles. Prothorax nearly as broad in the middle as at the base, strongly narrowed in front, the base feebly tri-sinuate and with the lateral angles rounded; the disc with a very fine and sparse puncturation which becomes coarser and very much closer in front and towards the sides. Scutellum large, slightly rounded at the sides, impunctate. Elytra feebly bi-costate, with six discal rows of small and rather remote punctures, the sides with scattered fine punctures and the apex slightly strigose. Pygidium sparsely setose and remotely punctured, transversely strigose only in the middle. Underside thinly clothed with yellowish-grey pubescence and punctured at the sides; metasternum with an impressed median line; sternal process broad, rounded and with an impressed hirsute line just before the apex; abdomen with a broad central depression. Legs stout, anterior tibiae with two large marginal teeth, and the apex rather obtuse, all the femora and tibiae thinly fringed with long golden-grey hair. Length 17 mm., breadth 9 mm.

MHOW (Type, *coll. Janson*); POONA (*coll. British Museum*).

Apart from the very peculiar coloration this pretty species differs from its nearest ally, *A. alboguttata*, Burm., in its narrower and less convex form, in having the prothorax more abruptly narrowed in front, the clypeus more strongly carinate and the pygidium strigose only in the middle. The darker markings on the upper side are produced by the absence of the lighter coloured opaque indumentum, that covers the other parts of the surface, leaving the derm exposed and with a talc-like lustre.* I have named the species after the discoverer, the late Captain R. Selous.

Clerota rigifica, n. sp.

Black and very shining above and below, with orange-yellow markings comprising a median stripe on the head, a marginal band on each side and a median stripe on the prothorax, a spot occupying nearly the whole of the scutellum, a broad and slightly sinuous longitudinal stripe on each elytron and a large triangular patch on each side of the pygidium. The sides of the mesothoracic epimera, metathoracic episterna and post-coxae, and a large spot at the sides of the first to fourth abdominal segments are also orange-yellow.

Head finely and sparingly punctured in the middle, more coarsely punctured in the lateral furrows, clypeus slightly sinuous at the sides and distinctly widened in front. Prothorax almost as broad as the elytra at the base and obliquely narrowed to the apex, broadly sulcate behind, very minutely and remotely punctured at the sides. Elytra slightly narrowed behind and separately rounded at the apex, sulcate at the suture, the middle third of the disc with several rows of more or less obsolete punctures, the sutural stria feeble and becoming obsolete before reaching the middle, the apical third of the sides and the apex very closely and deeply strigose. Pygidium broad and transversely convex, closely and concentrically strigose. Underside of the body almost entirely smooth, the flanks of the prothorax and sides of the basal abdominal segment feebly strigose;

* A second specimen from the Shevaroy Hills, Madras, that has since come to the British Museum, has these shining spaces covered to a large extent with a dense white squamose or farinose clothing, which is apparently very lightly attached and easily rubbed off, and in my type specimen is only present to a small extent on the sides of the prothorax and on the pygidium. It would most probably be found that in freshly emerged examples the clothing entirely covered the spaces, so that the markings of the upperside would be white instead of castaneous as I have described them.

mesosternal process very broad at the base, pointed and slightly curved inwards at the apex; anterior tibiae with the two lateral teeth and the produced apex acute. Length 36 mm., breadth 17 mm.

MOULMEIN, Lower Burma (Type in *coll. Janson*).

This fine species is closely allied to *C. vittigera*, Hope, but is larger and of a more robust form, the prothorax is broader at the base and less sinuate at the sides, the elytra more parallel-sided and longer in proportion to the prothorax, and the aedeagus of the male is much broader and less constricted before the apex.

The type specimen, a male, was taken flying by the late Col. Bingham in August 1894, and I have others from Penang; Mana Riang, Sumatra; and Kuching, Borneo. This distribution would seem to indicate that it is a Malayan species with a range extending northwards into southern Burma.

C. bodhisattva, Kunck., an evidently closely allied species from Annam and Tonkin, and only known to me by description, is of a much larger size (44 mm. in length) and has yellow markings on the elytra only.

Clerota arrowi, n. sp.

♀ Shining black, the outer edge of the epimera and posterior coxae, and a small spot on the sides of the second, third and fourth abdominal segments orange-yellow.

Head strongly punctured, the punctures of an ovate form in front and coarser, closer and irregularly confluent towards the apex, the extreme base smooth; clypeus a little narrowed towards the apex, the apical lobes rounded and with a strongly reflexed margin, the raised side margins becoming almost obsolete before reaching the eyes. Prothorax obliquely narrowed from the base, with the sides slightly sinuous and very narrowly margined, the basal angles obtuse, the entire surface, excepting a narrow and rather indistinct median line, with a very strong puncturation that becomes more dense as it approaches the sides and strigiform close to the lateral margins, the basal lobe broad and slightly depressed but not sulcate. Scutellum slightly sulcate and smooth in the middle, punctured at the base, the apex very acute. Elytra gradually narrowed from the base and sub-truncate at the apex, the basal part very convex and smooth, strongly punctured on the median third, the punctures extending to the humeral callosity at the side and forming five or six tolerably regular rows in the middle, and one row next the suture that extends to the base, the apical declivity and the sides, behind the middle finely and closely strigose. Pygidium and the apical dorsal segment of the abdomen finely and closely strigose, the former very prominent and feebly bi-nodose at the apex. Underside coarsely but rather sparsely punctured on the meta-coxae and sides of the metasternum; mesosternal process gradually narrowed to the apex where it is acute. Legs closely strigose on the femora and outer side of the tibiae, anterior tibia with the two marginal teeth and the produced apex very acute. Length 33 mm., breadth 15 mm.

KHASIA HILLS, Assam (Type in *coll. Janson*).

The strongly raised margins of the apical lobes of the clypeus form a semicircular rim to a pit-like cavity on either side, and coalesce with the narrow median carina at the base of the excision: this peculiarity and the strongly punctured and non-sulcate prothorax and closely strigose legs will suffice to at once distinguish *C. arrowi* from all the hitherto described members of the genus. In general aspect it most nearly resembles narrow examples of *C. budda*, G. P., that are without the usual yellow markings on the upperside.

Pseudochalcothea ritsemae, n. sp.

Body of a narrow oval form and deeply channelled along the median line of the upperside. Dark grass-green, shining; the sides and suture of the elytra with a reddish tinge in some lights; head, sides of the prothorax and underside golden green; antennae, palpi, tibiae and tarsi fulvous tinged in parts with green and coppery red. Head sparsely punctured, convex and smooth in the middle; clypeus a little widened in front, margined at the sides and deeply notched at the apex. Prothorax strongly narrowed in front, the sides sinuous and slightly emarginate at the basal half, the basal angles produced and sub-acute, smooth on the disc, punctured and strigose at the sides. Scutellum punctured at the base only. Elytra gradually narrowed posteriorly, separately rounded at the apex, the sutural angles a little produced and acute, some scattered fine punctures in the sutural depression and a regular row next the suture, at the sides four or five rather confused rows of punctures on the basal half and thence irregularly strigose to the apex. Pygidium prominent and closely strigose, deeply grooved and bi-nodose at the apex. Underside of the body almost impunctate; sternal process broad at the base and obliquely narrowed to a point at the apex; abdomen concave in the centre and broadly emarginate at the apex. Front tibiae slender, curved and without marginal teeth; hind tibiae on the inner side with a broad, thin and flattened appendage curving forwards, and towards its extremity narrowed and strongly bent backwards in the form of a sharply pointed hook. Length 26 mm., breadth 12 mm.

In the female, besides the usual sexual characters, the prothorax is broader in middle than in the male, the pygidium is only feebly bi-nodose, the apex of the abdomen is broadly rounded and the last segment and the apical part of the preceding one have a coarse setigerous puncturation, and the outer apical spine of the hind tibiae is broad and bi-mucronate.

RANGOON and PENANG (Types, ♂, ♀, in *coll. Janson*).

This species comes nearest to *P. virens*, Ritsema, but is smaller and of a much narrower and more parallel-sided form, and has the prothorax more strongly sinuate at the sides. The male differs, moreover, in the form of the appendage of the hind-tibiae, and the female in having the pygidium sulcate and the apical ventral segment of the abdomen rounded, instead of broadly emarginate as it is in *virens*.

P. ritsemae is the first *Pseudochalcothea* (if kept as distinct from *Plectrone*) that has been discovered on the mainland, the genus being essentially an insular one, with its head-quarters in North Borneo, and the occurrence of this species at Rangoon brings it just within the limits of the British-Indian fauna. *Plectrone tristis*, Westw., is recorded by Wallace from Penang.

Macronota batillifera, Bourg., Bull. Soc. Ent. France, 1914, p. 292.

This is the *flavofasciata*, Arrow (*nec* Moser), and is described by Bourgoin as a distinct species, differing in the structure of the hind-tibiae in the male. It is recorded from Bhutan and Assam.

The " female " specimen in my collection referred to by Arrow (" Fauna Brit. Ind.," Ceton., p. 52) proves upon dissection to be a male, and is the true *flavofasciata*, Moser, from Tonkin. The females of both species are apparently still unknown.

Clinteria sternalis, Moser, Deuts. Ent. Zeits., 1910, p. 532.

This addition to the Indian Fauna would appear, from the description, to come nearest to *C. modesta*, Blanch., in coloration, but is stated to have the mesosternal process broad and flat, a character not found in any other member of the genus. It comes from Pegu, Lower Burma.

Glycosia dureli, Pouill., Insecta iv, 1914, p. 187.

From the description and figures this is evidently a slight variety of *G. luctifera*, Fairm., with markings similar to those of the Indian specimens described by Arrow. It is also from Bhutan.

The following Notes refer to the "Fauna of British India," Cetoniinae.

Macronota, p. 41.

In the synonymy and sub-genera *Coilodera*, Hope, 1831, is cited as undescribed; it was later emended to *Coelodera*, and characterised by Burmeister, Handb. Ent. iii, 1842, p. 320.

M. diardi, p. 43.

The two specimens referred to (p. 44) with black elytra and purple-black prothorax are in my collection, and came from the late M. Jacoby, labelled "Ceylon (W. Morton)." This locality is most probably incorrect, as I now have similar specimens, from the van de Poll collection, from Mana Riang, Sumatra, and this form has since been described as a distinct species, under the name *maindroni*, by Bourgoin, Bull. Soc. Ent. France, 1916, p. 133.

M. mearesi, p. 45.

The type, as cited by Westwood, was in the Parry collection, which was dispersed by auction-sale, and the particular "lot" comprising this specimen was bought by Mr. R. Oberthur, in whose possession it should now be found.

Cyphonocephalus smaragdulus, p. 69.

Reference to Westw., Trans. Ent. Soc. Lond., 1878, p. 29, pl. 1, figs. 3, 4, is omitted.

Torynorrhina distincta, p. 82.

Var. *pilipes*, Burm. Handb. Ent. iii, p. 779; Westw., Arcana Ent. i, p. 120 and 192, is omitted from the synonymy. This is the brassy green variety and usually has the legs tinged with blue.

Rhomborrhina microcephala, p. 87.

Var. *staudingeri*, Nonf. Stett. Ent. Zeit., 1890, p. 17, is omitted. Nonfried described this as a variety of *micro-*

cephala, but the description applies to the typical form, and the name therefore sinks as a synonym.

The specimen bearing the " Type " label from the Parry collection, cited by Westwood, is in my possession.

Heterorrhina sinuatocollis, p. 96.

The type is incorrectly stated to be in the Paris Museum. The specimen described and figured by Westwood (as a variety of *elegans*, Fab.), as cited by him, was in the Parry collection, and is now in my possession. It bears Parry's " Type " label, and must be regarded as the type of this species, Westwood's description taking priority over that of *smaragdina*, Burm. (*nec* G. P.), and it is the type of the latter that is in the Paris Museum.

Anatona alboguttata, p. 115.

Reference to Westw., Trans. Ent. Soc. Lond., 1874, p. 476, pl. 7, fig. 4, is omitted.

Glycyphana minima, Bates, Entomologist, xxiv, 1891, Supp. p. 21.

This species, founded on a single specimen stated to have been received from Captain G. Young, from the Hill region of Kulu, North-western India, is omitted. Mr. Arrow informs me that he doubts the correctness of the locality assigned to it, and believes it will prove to be of Malayan origin. I have at present seen nothing from India that agrees with the description.

Goliathopsis despectus, p. 206.

The type of this species is undoubtedly the specimen in the Oxford Museum, which I have examined and found to agree with Westwood's description and figures. It, moreover, has the mouth-parts extracted and mounted on a card beneath the specimen, as is usually the case with the Westwoodian types. I have before stated (Cist. Ent. ii, 1881, p. 610) that Westwood's figures were evidently not made from the specimen that is in the British Museum.

The examination of the type of *despectus* has shown me that *cervus*, Jans., is not the same species. In comparing the two forms (the female type in both cases) I find that in *cervus* the clypeus is more broadly and strongly reflexed at the apex (especially at the sides, where it projects in an obtuse angle), the prothorax is conspicuously larger and more convex and has the basal angles more prominent; it is also of an altogether stouter and more robust form than *despectus*, and the mouth-parts differ, as will be seen on comparing the figures that accompany the original descriptions of both species.

The following that have been relegated by the author to the rank of varieties and synonyms, have, I consider, sufficient distinctive features to warrant their retention as species :

Cyphonocephalus smaragdulus, Westw., sunk under *C. olivaceus*, Dup., p. 69.

Heterorrhina mitrata, Wall., sunk under *Diceros dives*, Westw., p. 72.

Glycyphana subcincta, Jans., sunk under *G. torquata*, F., p. 124.

Protaetia aerata, Er., sunk under *P. orientalis*, G. P., p. 143.

Clinteria valida, Lansb., sunk under *C. auronotata*, Bl., p. 179.

Clinteria decora, Jans., sunk under *C. klugi*, Hope, p. 187.

Agestrata samson, Sharp, sunk under *A. orichalcea*, L., p. 192.

Goliathopsis cervus, Jans., sunk under *G. despectus*, Westw., p. 206.

V. *On the Protocerebrum of* Micropteryx (*Lepidoptera*).

By P. A. Buxton, B.A., F.E.S., M.R.C.S., Fellow of Trinity College, Cambridge (Lieut. R.A.M.C.).

[Read February 7th, 1917.]

Plates VII–X.

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FOREWORD

More than four years ago I commenced to study the internal anatomy of *Micropteryx* (*Eriocephala*) in the hope that I might be able to throw some light on the question of its systematic position. As is well known, most entomologists regard it as a primitive Lepidopteron (Protolepidoptera), though there is really quite as good ground for regarding it as a Trichopteron.* I am now in a position to publish my results only in so far as they relate to a portion of the brain of that insect. This I do with a feeling

* *Vide,* however, Dr. Chapman's paper (Trans. Ent. Soc., 1916, pp. 310–4, pl. 81–93, (1917)), which raises *Micropteryx* to ordinal rank (order *Zeugoptera*).

that some apology should be made, because I do not at any rate describe the whole brain: it is owing to the war and pressure of other work that there is no likelihood of my being able to carry my investigations further. This paper is however complete in itself, and is not of the nature of a preliminary note. From the point of view of comparative anatomy, the Protocerebrum, with which alone this paper deals, is by far the most important part of the insect brain, not only on account of its complicated structure, but also because of certain questions relating to the homologies of some of its parts. Such questions of homology do not at present arise in connection with the Deuterocerebrum or Tritocerebrum, or ventral brain. My hope that my investigations would throw light on the systematic position of *Micropteryx* will not be fulfilled until we can compare the brain of this insect with a number of other Lepidopterous and Trichopterous brains, after they have been fully and properly investigated.

I have made some attempt to render this paper useful also as an introduction to the study of the brain of insects; this I think is justified, because it is the first paper on the subject published in Great Britain since 1878 (Newton), and I know by bitter experience how exceedingly difficult it is to obtain a clear knowledge of the subject from a variety of papers written by many men in many languages at different dates. My task has been rendered difficult by the small size of *Micropteryx*, which is, I believe, the smallest insect of which the brain has been investigated in any detail.

I take this opportunity of acknowledging how much I am indebted to many friends in the University's Zoological Laboratory at Cambridge, particularly to Mr. F. Balfour Browne for constant criticism and much good advice, and for reading through the whole paper before it was published; also to Mr. L. A. Borradaile for helping me with the theory of the segmentation of the head of the Arthropoda; also to Dr. D. Keilin of the University of Paris, and of the Quick Laboratory and Magdalene College, Cambridge, for putting at my disposal his deep knowledge of fixing and staining. Canon W. Brocas Waters gave me a room to work in, while I was stationed in Bury St. Edmunds on military duties.

I must also acknowledge my indebtedness to Dr. K. F. Kühnle of Stuttgart for his paper on the brain of the

Earwig and other types (see Bibliography), which gives a full review of insect neurology up to 1913, together with a bibliography and a table of the terminology of the insect brain, which has materially lightened my labours. This paper is by far the most important contribution which has yet been made to insect neurology.

All my material has been collected in the neighbourhood of Cambridge, and I have worked entirely with *Micropteryx* (*Eriocephala*)* *calthella* (Linn.), and not with any other species.

INTRODUCTION.

The anterior part of the central nervous system of insects consists of a supraœsophageal portion, which is the brain in the narrow sense of the word. From this the circumœsophageal commissures pass round the œsophagus to the ventrocerebrum or subœsophageal portion of the brain. Most authors include this also in the brain of the insect. The supraœsophageal ganglion, or brain in the narrow sense of the word, was found by Viallanes to be composed of three paired elements or neuromeres, which he believed to be segmental; these give rise to the parts of the brain to which he gave the names Protocerebrum, Deuterocerebrum (or Deutocerebrum) and Tritocerebrum. We now know that the Protocerebrum is not a segmental ganglion; and it will be convenient at this point to give a short summary of the results obtained by those who have studied the subject of the segmentation of the head of the Arthropoda, and the homologies of the various appendages throughout the class from the point of view of comparative embryology. The whole matter is one of great difficulty, and has been neglected by insect neurologists; as, however, it is a matter which bears directly upon the subject of this paper I give this summary of our knowledge in so far as it affects the insect protocerebrum.

* The subject of this paper belongs to the true genus *Micropteryx* Hübner. This genus has been referred to in some writings, *e.g.* Meyrick's Handbook, the Cambridge Natural History, etc., under its synonym *Eriocephala* Curtis: while the leaf-mining genus erroneously called "*Micropteryx*" in certain of the same works should be known as *Eriocrania* Zeller.

Eriocephala Curtis = *Micropteryx* Hübner.

"*Micropteryx*" auctt. (nec Hübner) = *Eriocrania* Zeller.

See Tutt, Brit. Lep., I, pp. 129–137 (1899), and Staudinger-Rebel, Cat., II, pp. 246–8 (1901).

The brain of the Arthropoda in its fullest development, that is to say as exemplified in the brain of the embryo of *Scolopendra* (Heymons), consists of the following parts: an archicerebrum, which is median, unpaired and preoral: three lobes on each side, the syncerebral lobes, the outer two of which arise from a common rudiment; these also are preoral, and together with the archicerebrum form the syncerebrum: the preantennary ganglion, or protocerebrum, which is the ganglion of the first somite, or true segment; we believe that this was primitively postoral, but it is preoral in all living Arthropoda: the deuterocerebrum or antennary ganglion, and the tritocerebrum or premandibular ganglion, which correspond respectively to the second and third somites. It may be said at once that the deuterocerebrum and the tritocerebrum correspond in Heymons' nomenclature to the organs which I shall subsequently describe under those names. This is not, however, the case with the protocerebrum, for that word has been used in a great variety of senses. In the development of the insect head that part of the central nervous system which entomologists generally call the protocerebrum (Viallanes) is developed from the archicerebrum and the syncerebral lobes: we do not yet know which parts of the insect brain correspond to which of these structures, except that the outer syncerebral lobe gives rise to the optic lobe, and Haller suggests that the mushroom body is formed from the archicerebrum. The preantennary ganglion or protocerebrum of Heymons is not found at all in the insect head, and is to be carefully distinguished from that part of the brain which is commonly called by that name. The synonymy is further complicated because the preantennary ganglion or protocerebrum of Heymons is the precerebrum of Verhoeff, and the word "protocerebrum" has been used in yet a third sense to denote the procerebrum of Heymons, that is the syncerebrum and preantennary ganglion (protocerebrum) together. The word protocephalum has been used by Holste, and perhaps by others, to denote that part of the brain which is dorsal to the gut in the insects: *i. e.* the syncerebrum of Heymons (the protocerebrum of insect neurologists since the time of Viallanes), with the deuterocerebrum, and the tritocerebrum.

I shall continue to use the word protocerebrum in the sense in which neurologists from the time of Viallanes have always employed it, though I should be glad to avoid a word to which so many meanings have been assigned. By it I mean a mass of nerve tissue arising from that preoral part of the embryo which is not segmented and which bears no appendages. It is the nervous element corresponding to the acron of some embryologists, and it is not the serial homologue of the deuterocerebrum and tritocerebrum (mesocerebrum and metacerebrum of some writers on the segmentation of the Arthropoda). The protocerebrum of insects is, in fact, the syncerebrum of Heymons, unless it contains some element not yet differentiated as belonging to the preantennary ganglion.

In this paper I propose as I have said to deal solely with the protocerebrum. I give, however, the following brief summary of the function and connections of the other two supraœsophageal ganglia. The deuterocerebrum is the ganglion of the antenna, to which it gives motor and sensory nerves. The pair of ganglia forming the deuterocerebrum are united across the middle line above the œsophagus, and lie before and below the protocerebral lobes. They are the antennary or olfactory lobes of some authors. The deuterocerebrum gives rise to the paired sympathetic system, which lies upon the lateral wall of the œsophagus on each side; this consists of two pairs of small ganglia with nerves which connect them to each other, and, as is known in some insects, to the median or tritocerebral sympathetic system. The pair of ganglia composing the tritocerebrum lie on each side of the anterior part of the œsophagus and are generally fused above to the rest of the supraœsophageal brain. The lower part of the tritocerebrum is the circumœsophageal connective or commissure. This ganglion supplies the labrum, but has no paired appendage connected with it in the insects; a band of fibres, the tritocerebral bridge, passes across from one side to the other beneath the œsophagus. The tritocerebrum also gives rise to a pair of fine nerves which run forwards and inwards to the frontal ganglion, which lies upon the upper surface of the anterior part of the œsophagus. This is the largest ganglion of the sympathetic system: from it a fine nerve runs forwards and another backwards. This latter, the *nervus recurrens* of some authors, connects the frontal ganglion with a short chain of ganglia lying on the upper surface of the œsophagus, and from this unpaired sympathetic system the stomodaeum is innervated.

The subœsophageal ganglia or nerve masses will not again concern us. They are formed by the fusion of four segmental ganglia, the mandibular, the intercalary, the maxillary and the labial. The intercalary ganglion has hardly been noticed by insect neurologists; the corresponding appendage is the maxillula, which is vestigial or absent in adult insects; the ganglion is accordingly ill-developed or absent. The other three ganglia are mainly if not entirely motor and sensory centres to their respective appendages.

All the nerve centres of insects consist of the following layers.* They are bounded externally by a neurilemma, which is a thin syncytial structure. Within this, and lying loosely in a quantity of fluid, are the nerve cells, or ganglion cells. The processes of these, the axons, pass inwards to form the innermost part of the centre; here they unite in very large numbers to form the tissue known as axonic substance (or fibrillar material), which consists of innumerable axons and their twigs bound together by a varying amount of neuroglia. Of this axonic substance two types may be distinguished; the first is that which is called Punktsubstanz, or Marksubstanz, or neurospongium; its composition was first accurately explained by Viallanes. Until his day it had been known as a tangled web, but in it he distinguished very fine axis cylinders running in all directions, and their twigs, and also the neuroglia. In the second type of fibriliar substance, the Fasersubstanz, the axons run in bundles and form well-defined tracts in which there is little or no neuroglia. The distinction between these two types must not be insisted upon, for every degree of intergradation may be found; even in the most indisputable Punktsubstanz small tracts of fibres may generally be detected. Physiologically again the difference is one of degree, though Fasersubstanz is mainly a tissue of conduction, Punktsubstanz one of association, that is to say one in which impulses pass from one neuron to another.

Two parts of the brain may be connected either by fusion of their component Punktsubstanz (*Verschmelzungen, soudures*), or by definite tracts of Fasersubstanz (*Faserverbindungen*). This distinction, again, has only a relative value.

Before we pass to examine the structure of the various

* The general relation of neurilemma, cells and axonic substance is shown on Plate X.

parts of the protocerebrum it should be realised that this portion of the brain is not merely a complex but also an entity. We might compare it physiologically to the cerebrum of a vertebrate. Both are known to be the highest or governing centres of the organism; both possess a solidarity or unity of action; both consist also of parts, each of which in its turn is not only an anatomical, but also a physiological entity. We are quite justified in regarding the protocerebrum of an insect as the headquarters from which are directed all those complicated reactions and instincts of the organism which give to its activities what at any rate appear to be purpose, and adaptation to the surroundings. There is too great a tendency to lay emphasis on the potentialities for independent action which are undoubtedly possessed by the lower nerve centres of the insect. In all but the very lowest insects there is a marked degree of specialisation in the structure and function of the protocerebrum, and this fact of its solidarity should not be allowed to pass from the mind while we study in detail the structure and perhaps something of the function of its parts.

THE PROTOCEREBRUM OF MICROPTERYX.

I. The Neurilemma and Ganglion Cells.

The whole brain of *Micropteryx*, that is to say the axonic parts and the cells, is included in a limiting membrane or Neurilemma (Plate X). This is a very fine sheet of substance which stains well with the acid stains. It is certainly a syncytium in *Micropteryx*, and probably in all insects. In places where no ganglion cells intervene between the neurilemma and the axonic part of the brain the two are closely applied to each other, and the neurilemma can hardly be distinguished, though in material fixed in the picro-chlor-acetic mixture it can generally be seen. Occasionally the nuclei of the neurilemma can be seen even when the layer itself is indistinguishable. The neurilemma is somewhat thickened mid-dorsally, partly owing to the fact that a number of tracheal tubes (Plate X) lie in it in this position, partly owing to the presence of a number of the nuclei, the cells corresponding to which have fused to form the syncytium of which the neurilemma consists. These nuclei are elongate and smaller than those of "normal" ganglion cells. They stain deeply with hæmatoxylin. The neurilemma is continuous over the whole brain dorsally and ventrally and also over the optic lobes; it is continued downwards to cover the ventral parts of the central nervous system.

THE GANGLION CELLS.—These are spread over the whole anterior and superior parts of the brain, in a layer which reaches its greatest thickness mid-dorsally. The layer is discontinuous or absent beneath the protocerebrum. On the upper side of the brain the cells may be as many as 15 cells deep, particularly near the middle line between the ocelli. Various types of ganglion cell must be distinguished. They all possess a spherical nucleus and a very small quantity of cytoplasm. The normal cells (*g. c.*) cover the protocerebrum above, before and behind. Cells of this type, which is much the most abundant, are either motor or else cells of connecting-fibres (Kenyon). The cells of the mushroom body (*mb.c.*) are found as a rounded mass of cells lying just over the head of that organ. Their nuclei stain heavily with hæmatoxylin; they are also smaller than the normal cells. The fibres from these cells pass into the mushroom body. The distinction in size between these cells and those of the normal type is not very great; it can be best observed in material fixed in Gilson's fluid. The cells of the optic lobes (*o. c.*) are still smaller than those of the mushroom body; and their nuclei are absolutely spherical and stain very heavily and completely. No structure within the nucleus can be detected in ordinary sections and this gives to the masses of cells a very characteristic appearance. The cytoplasm, per contra, is scarcely stained at all. These cells form a deep coating which completely envelopes the three optic ganglia; this layer is less deep above than below. In *Micropteryx* giant cells (*gi. c.*) are found in small numbers round the base of the mushroom body just where it passes into the protocerebral lobes (fig. 12, etc.). These cells are few in number, hardly more than a score on each side. Their nuclei are spherical and about four times as large as those of normal cells; there is a considerable quantity of cytoplasm, which can be stained with eosin; this distinguishes it at once from the cytoplasm of the other types of ganglion cell. The nucleolus is generally clearly seen. Haller states that these cells are mainly, but not entirely, concerned with conduction across the middle line, and that their axons pass to the opposite side of the brain, to the antennary lobe or head of the mushroom body, or even into the optic lobe. Inside the brain are found small cells, lying singly or in groups (Plate X). Kühnle refers to them as neuroglia cells (*ng.*) and doubtless he is correct in so doing. They are found particularly in the space surrounding the central body and in the interval between the two capsules of that organ; there are also a few on the surface of the stem of the mushroom body and in other places (Pl. X). The nucleus of a neuroglia cell is pyriform or elongate and stains deeply, and its outline is generally irregular. The nucleus is smaller than that of a "normal" ganglion cell.

The axons from the ganglion cells enter the axonic part of the brain vertically; and they are generally united into small bundles at their point of entrance. It is to this that Kühnle gives the name *Einströmmung*.

Spherical black granules occur among the cells in material fixed in osmic acid, or any mixture containing osmic acid. These granules are not found in material fixed in any other fluid, and I regard them as unsaturated fat. They are found among the ganglion cells and are quite definitely extracellular.

A note on technique is given at the end of the paper; suffice it to say here the cells may be studied in material fixed in the picro-chlor-acetic fluid, but that some specimens may with advantage be fixed in Bouin's or Gilson's fluids, especially for the study of the different types of cell.

Tracheation.—In the brains of most insects fine tracheal trunks can be detected ramifying in the fibrillar part of the organ. This is not the case in *Micropteryx*, perhaps because of the extremely small size of the whole insect: so far as I can discover there are no tracheae at all, either in the ganglion cell layer or the axonic fibrillar part of the brain. There is a considerable collection of tracheal trunks (*tr.*) in the neurilemma which lies over the mid-dorsal part of the brain (Plate X), and it is at least possible that it is the function of these trunks, which are large and numerous, to oxygenate the brain by diffusion through the fluid which lies beneath the neurilemma.

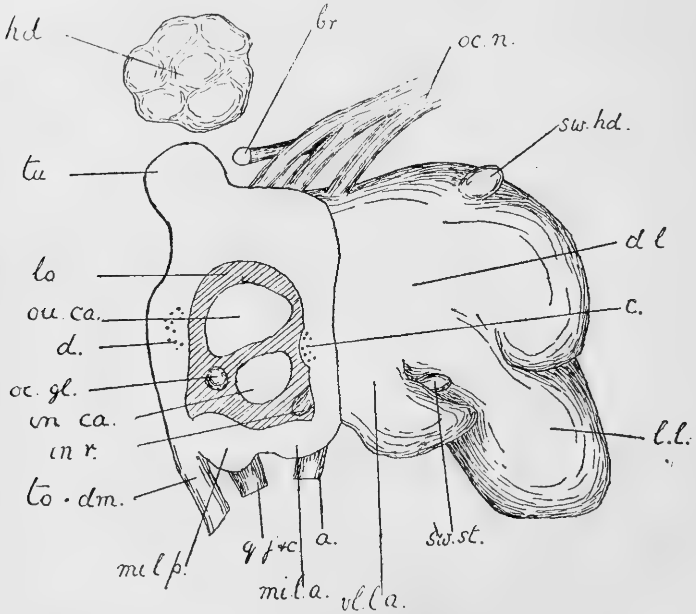
II. The Protocerebral Lobes.

The protocerebrum of insects is generally described as consisting of the protocerebral lobes and the various structures such as the mushroom body, the central body, the bridge, the ocellary glomerulus, and the optic lobes. The term "protocerebral lobes" is a comprehensive term for the great mass of the protocerebrum in or upon which the other structures lie. The word "lobes" is perhaps unfortunate, but its use in all papers from an early date to the present day renders it a classical term. In all insects the protocerebral lobes (*pc. l.*) form by far the greater part of the brain; they are bilaterally symmetrical about the middle line, but they are not divided from one another by a raphe. Kühnle describes their fusion across the middle line (*Verschmelzung*), "above," "below," etc. This is perfectly accurate, but it would give a clearer impression to say that the two lobes are united over their whole extent at the middle line, except that in the centre a space (*la loge*, Viallanes) is left in which lie the central body and ocellary glomeruli, and the inner root of the mushroom body.

The union of the two sides in *Micropteryx* is complete, but much less definite posterodorsally. Only a very vague web of fibres covers the central body in this region. It would, for instance, be possible for a micro-organism to swim down from the fluid in which the ganglion cells lie through this web into the space surrounding the central body. The protocerebral lobes together form a rounded mass, with its longest axis in the transverse direction. The mass is flattened above, and prolonged downwards to fuse with the deuterocerebrum and the tritocerebrum. The dividing line between the deutero- and trito-cerebrum cannot be accurately determined. In the embryo they lie behind one another. In most adult insects, and *Micropteryx* is no exception to the rule, the deuterocerebrum is pushed forwards, and the tritocerebrum fuses directly with the protocerebrum, at any rate by a small part of its posterior surface. From the lateral side of the protocerebrum the optic nerve is given off. This connects the protocerebrum to the optic lobes (medullary masses of the eye).

The relations of the protocerebral lobes are as follows (text fig. 1, p. 122): mid-dorsally lie the rounded heads of the mushroom bodies, and between them the bridge. Slightly in front of this the ocellary nerve is seen, disposed in a transverse plane with a slight inclination downwards and backwards. Various organs lie within the protocerebral lobes in a space full of fluid which has been called *la loge* by

Viallanes. These organs are the central body and the ocellary glomerulus, and the stem and inner root of the mushroom body; the forward and backward roots are also buried in the protocerebral lobes, but they are not definitely separated from the surrounding parts by a free space. It may be mentioned here that the mushroom body system is completely buried in the protocerebrum except at three points. The parts which project are the head, the lower end of the stem, and the tip of the forward root (see pp. 125 *sqq.*).



Text figure 1.—General relationships of the parts of the protocerebrum. The organ is divided at the middle line and the left side is shown in the figure, viewed from in front. The cut surface shows the loge of Viallanes and the organs within it. No cells are shown; the whole organ as drawn here consists of axonic substance. *a, c, d, j, q,* refer to tracts of fibres (see p. 136). *br.* bridge. *d. l.* dorsal protocerebral lobe. *hd.* head of mushroom body. *in. ca.* inner capsule of central body. *in. r.* inner root of mushroom body. *l. l.* lateral lobes of protocerebrum. *lo.* la loge (Viallanes). *mi. l. a.* and *mi. l. p.* anterior and posterior parts of middle lobe of protocerebrum. *oc. gl.* ocellary glomerulus. *oc. n.* ocellary nerve. *ou. ca.* outer capsule of central body. *sw. hd.* swollen head of ascending branch of mushroom body. *sw. st.* swollen foot of stem of mushroom body. *to dm.* tracts passing from protocerebrum to deuterocerebrum. *tu.* tumulus. *vl. l. a.* anterior part of ventrolateral lobe.

Special names have been assigned to various parts of the protocerebrum (refer to Pl. VII–IX). Thus dorsally there is the dorsal lobe (*Hauptlappe*), below this the ventrolateral lobe or *Nebenlappe*, and midventrally the middle lobe (*Mittelstück*). These parts may all be distinguished in *Micropteryx*, and perhaps the mere shape of the lobes merits description. The dorsal lobe (*d. l.*) is the widest part of the whole brain. In front its superior surface is flat; further back there is a specialised rounded projection in the middle line, to which I give the name Tumulus (*tu.*). This lies between the heads of the two mushroom bodies, and consists of a very tight homogeneous web of axonic substance more densely compacted than any other part of the brain. The portions of the dorsal lobe which lie around and beneath it are of an extremely loose consistency (see Pl. X).

A large lateral lobe (*l. l.*) is present on each side.* Its relations are shown in figs. 10, 12, 13.

The ventrolateral lobes (*Nebenlappe*) consist of two very definite parts placed one in front of the other. The anterior part of the ventrolateral lobe (*v.l.l.a.*) appears as a swelling below the anterior extremity of the stem of the mushroom body; in the region beneath the inner root of the mushroom body the lobe is insignificant; and behind this its posterior part (*v.l.l.p.*) appears as a large round lobe above the exit of the motor antennary nerve from the deuterocerebrum.

The middle lobe (*mi. l.*) of the protocerebrum lies between the two ventrolateral lobes. In most insects it consists of a single body, shaped like an hour-glass, and lying transversely between the inner roots. In *Micropteryx* we can distinguish an anterior and a posterior part of the lobe. The anterior portion (*mi. l. a.*) is of the shape of an hour-glass, and lies, as it should, between the ends of the inner roots; it is connected with the anterior part of the ventrolateral lobe on the same side by a tract of nerve fibres (tract *h*). Behind it there is a transverse bar of axonic tissue, placed below the ocellary glomeruli and above the various bands which connect the two antennary lobes or deuterocerebra; this is the posterior part (*mi. l. p.*) of the middle lobe; to the antennary lobe and also to the protocerebrum above it this middle lobe is united by well-marked tracts of nerve fibres (tracts *j* and *k*).

* This is not *le lobe latéral du protocérébron moyen* of Viallanes, which is the ventrolateral lobe.

Histologically the whole of the protocerebral lobes are very uniform in structure, and consist of Punktsubstanz of a moderate degree of density. The tumulus, however, is very much closer in structure, and the parts of the protocerebral lobes immediately below and around it are very loosely formed. The lobes are penetrated in all directions by bundles of axons (Fasersubstanz), some of which are enumerated below.

III. The Mushroom Body.

(Stalked body—Packard. Pilz—Kühnle, etc. Gestielte Körper—Leydig. Les Corps Pédonculés—Dujardin.)

Before I describe the mushroom body of *Micropteryx* it may not be out of place to state that the organ consists typically of a cup-shaped or globular head (*calice, Pilzhut, Becher, lobe à convolutions*) supported by a stem (*Stamm, tige, cauliculus, pedunculus*) which divides below into a number of roots or branches. The word *Stiel* is used by Kühnle to denote the stem and roots together. An early worker, Newton, described the brain of the cockroach. In this insect the head and stem of the mushroom body are double, and Newton named the two stems the cauliculus and pedunculus, respectively. A small number of insects have their mushroom body formed on a simpler plan, with only one head and one stem. It is better, therefore, not to use the terms cauliculus and pedunculus, which are responsible for the notion that two supports of the mushroom body are to be looked for in the typical insect brain. As will be seen later the homologies of the roots of the organ are very obscure.

This exceedingly simplified account of the least complex type of mushroom body may serve to remind the reader of the essential characters of that organ. A full account of that of *Forficula*, together with a painstaking summary of previous work, is given by Kühnle. This is valuable, but as I shall explain later I believe that Kühnle has made a fundamental mistake in homology. The summary in Packard's text book is out of date and most difficult to understand.

At first sight it appears that the mushroom body of *Micropteryx* is formed on a plan not altogether identical with that found in other insects. This is not very surprising, for nothing is yet known of the brains of the *Lepidoptera* or *Trichoptera*. I hope, however, to show that the difficulties are rather apparent than real, and that *Micropteryx* is really one of those organisms from the study of which we may draw valuable inference as to the comparative anatomy of the insect brain. It is always a most difficult thing to form a picture of the mushroom body of an insect when that organ is described by another worker. This is due, in part at least, to the complexity of the organs which lie in all three planes of space. I shall endeavour to make my meaning clear by giving several sketches of a mental reconstruction of the organ in question. Its structure in *Micropteryx* is comparatively simple, and I have not found it necessary to make a wax-plate model. I have, of course, most carefully examined sections in all three planes of space (text figs. 2, 3, pp. 128–9).

The head of the mushroom body of *Micropteryx* is a single globular mass of axonic tissue, and belongs to the *Höcker* type of Kühnle. It appears that a similar structure was described by Flögel in certain moths; but it is never easy to understand his descriptions, for he was much hampered by the defective methods of his time.

The head of the mushroom body (*hd.*) projects conspicuously into the ganglion cells above and behind. It is not so large, however, as to make a prominence in the upper surface of that layer.

From the cells of the mushroom body (p. 119) the fibres pass into the head of the mushroom body. We must notice that there are no points at which a number of fibres enter together; the entry is general and spread over the whole surface of the head. Kenyon's application of the Golgi method to the brain of the bee makes it clear that after entering the substance of the head the fibres give off a collateral branch which in turn divides to form twigs. These twigs interlace with similar twigs from the collaterals of other cells to form a glomerular body (*Faserbällchen*). There must be several score of these bodies in the head of the mushroom body of *Micropteryx*. They are very small and by no means easily distinguished. After giving off its collateral the fibre proceeds downward as a component part of the stem. The fibres do not form a definite tract within the head, but pass through in a diffuse manner. It is only when they reach the underside that they unite to form the stem.

From the inner and inferior aspect of the head of the mushroom body a band of fibres sweeps downwards and inwards past the side of the outer capsule of the central body. This band gives off a few fibres to the outer capsule (tract *n*), and then passes into that region of the protocerebral lobes which lies on each side of the central body (tract *r*); there the band divides and is lost to sight (Pl. VIII, fig. 12, and Pl. X). Such a tract has not been described in other insects.

The stem (*st.*) of the mushroom body leaves the ventral side of the head and passes downwards and forwards and also slightly inwards; it is a single cylindrical rod of parallel fibres; and whatever may be the case in other insects it is not penetrated by a canal. It may also be noticed that it is not surrounded by a sheath. (Even if it were I should not follow Kühnle in calling the sheath a neurilemma. A neurilemma is a syncytial layer covering a brain or ganglion.)

The stem is one of the most striking features of any section in which it occurs; it stains more heavily than the surrounding protocerebral lobes, and is a most useful landmark. The stem is a cylindrical structure, and well-fixed material shows that the greater part of its shaft is surrounded by a space which is not developed at its top or bottom; at these points the stem simply pierces the surrounding parts of the protocerebral lobes. At its lower and anterior end the stem is swollen and becomes superficial, that is to say it is no longer buried in the protocerebral lobes, but reaches the surface in the interval between the dorsal lobe and the anterior part of the ventrolateral lobe. At this point it is covered by a few nuclei; some of these are merely nuclei of neuroglia cells, some are nuclei of true nerve cells, which send their axons into the foot of the stem. This is certainly remarkable, but I have satisfied myself that it is the case by examining a large number of sections through this region.

At the bottom of the stem we should expect the roots to arise, and actually we find two processes of rather uncertain homologies, both of which make a marked angle with the stem. The first runs inwards and slightly backwards, and is the inner root (*in. r.; innere Wurzel* of Kühnle). It is straight and cylindrical and separated from its fellow of the opposite side by a very distinct part of the protocerebrum, the anterior part of the middle lobe. At its termination the inner root is somewhat swollen.

The second structure which leaves the anterior end of the stem may be called the ascending trunk (*as. tr.*). The homologies of this organ are obscure and will be discussed later. It runs upwards for a very short distance and divides into two portions.

At its point of division it is swollen. For the moment let us call one of its branches the ascending and the other the posterior branch.*

The ascending branch (*as. br.*) runs up directly to the surface of the brain and is there swollen into an acorn-shaped head. It is covered by a thin layer of ganglion cells of the normal type, and these send their axons into the branch. This is a point of interest, for here and also at the foot of the stem we have a few nerve cells which appear to belong to the mushroom body. Similar conditions have been occasionally described in other insects, notably in *Periplaneta* by Haller.

The posterior branch (*po. br.*) of the ascending trunk runs backwards and slightly upwards and inwards. Its terminal part is bifid, but the two portions do not diverge from one another. It is completely enclosed in the protocerebral lobes, and even in fixed material is not always very easy to see. It is about two-thirds the length of the stem. Before we proceed to discuss the homologies of these organs it is absolutely necessary to grasp their anatomy and relationships.

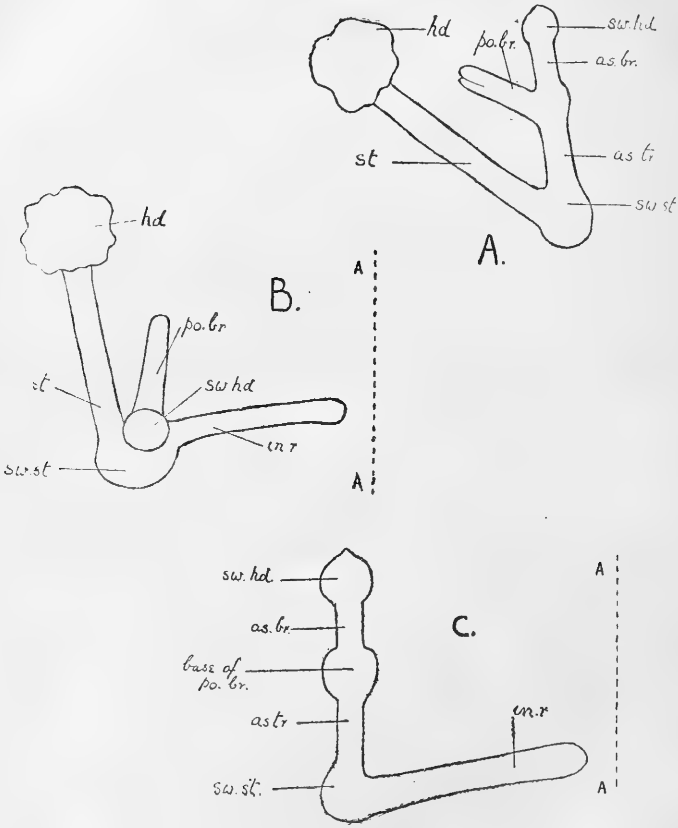
Let us now consider the homologies of these three branches of the stem. The first I have already identified as the inner root (*innere Wurzel* of Kühnle). This identification rests on its relations to other organs.

The ascending trunk is an organ for which I find no parallel in any insect brain yet investigated. This is not very remarkable when we remember that the brains of no *Lepidopteron* or *Trichopteron* have yet been fully described. According to a view which I now put forward the ascending trunk is to be regarded as the united base of the forward root (*vordere Wurzel*) and of the backward root (*rücklaufige Wurzel*). Great obscurity exists with regard to

* I use the term "trunk" and "branch" rather than "root" in order not to commit myself to any view as to homologies which are fully discussed later. The terms are of a provisional nature. It may be objected that I am adding to the synonymy, but it is almost a necessity to have some unequivocal name for an organ until its homologies are fixed. The word "root" I use as a full equivalent of the German *Wurzel.*

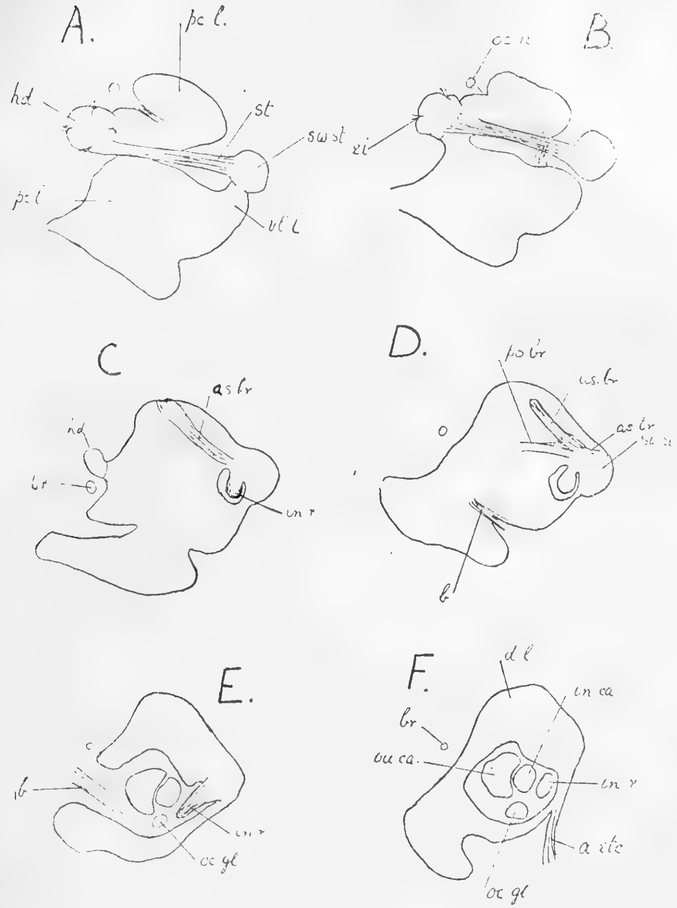
the homologies of the ascending and posterior branches of the ascending trunk.

It is probably best to consider the ascending branch as forward root (*vordere Wurzel*, Kühnle; *tubercule antérieur*,



Text figure 2.—Outline drawings of the right mushroom body. A, seen from the outer side (lateral view). B, from above. C, from in front. (The stem and head are behind and not shown in this drawing.) The line AA represents the median (sagittal) plane. The cells are not shown; the whole organ as drawn here consists of axonic substance.

as. br. ascending branch. *as. tr.* ascending trunk. *hd.* head of mushroom body. *in. r.* inner root. *po. br.* posterior branch. *st.* stem. *sw. hd.* swollen head of mushroom body. *sw. st.* swollen foot of stem.



TEXT FIGURE 3.—Outline drawing of six longitudinal vertical sections (A–F), to show the relations of the parts of the mushroom body to surrounding *pc. l.*, the last being nearest the middle line. The six sections are not consecutive. Dorsal is to the left; anterior (cephalad) towards the top of the page. Only the axonic parts are here shown, the cells being omitted.

a. etc. nerve fibres of tract *a* (p. 136) and other tracts, passing from protocerebrum to lower parts of brain. *as. br.* ascending branch. *as. tr.* ascending trunk. *b.* tract *b.* *br.* bridge. *d. l.* dorsal lobe. *ei.* Einströmmung (p. 120). *hd.* head of mushroom body. *in. ca.* inner capsule of central body. *in. r.* inner root of mushroom body. *oc. gl.* ocellary glomerulus. *oc. n.* ocellary nerve. *ou. ca.* outer capsule. *pc. l.* protocerebral lobes. *po. br.* posterior branch. *st.* stem. *sw. hd.* swollen head of mushroom body. *sw. st.* swollen foot of stem. *vl. l.* ventrolateral lobes.

Viallanes). This is suggested by its general direction and by the fact that it ends on the surface of the fibrillar part of the brain, under a thin portion of the ganglion cell layer. With this we may compare the similar "free" ending of the *tubercule antérieur* in Acridians (Viallanes, 1887, p. 42, fig. 46), and of the *vordere Wurzel* in *Apis* (Jonescu, p. 137, Text fig. 10*a*) and in *Vespa* (Viallanes, 1886). The author remarks: "*La première se porte directement en avant pour gagner la surface antérieure du renflement primaire; c'est la corne antérieure.*"

If, then, the ascending branch is the equivalent of the *vordere Wurzel*, we must homologise the posterior branch with the *rücklaufige Wurzel*, or backward root, in consideration of its backward direction and deeply buried termination: this would probably be accepted were it not that Kühnle has asserted that the *tubercule antérieur* of Viallanes is the homologue of the *vordere Wurzel* and also of the *rücklaufige Wurzel*. Against this I must enter a most emphatic protest. In the first place, there is an inherent improbability about it; we cannot willingly believe that *vordere* and *antérieur* refer to an organ which is described in other insects as "running back" (*rücklaufige*). We surely need good evidence before we can accept such a statement? In the face of that improbability Kühnle was dangerously bold in asserting the homology. When a great many more types have been investigated we shall be able to bridge many of the gaps which at present exist in our knowledge. Till then we can none of us be certain of any but the most obvious homologies, partly because the described types are so few, partly because no living man has first-hand knowledge of more than half a dozen insect brains.

Kühnle was probably led into this error by the fact that the majority of insect brains show only two roots, some of them lacking the forward, others the backward root.

If, however, Kühnle's homology be accepted, the one which I have suggested must fall; for clearly I cannot give the terms *vordere* and *rücklaufige* to two structures if, as Kühnle says, they are in this case synonymous. I do not wish to press my own convictions unduly; but at any rate they are based on considerations of relative position, that is to say on actual fact.

If, then, Kühnle is right and I am wrong, we may either assume that the ascending trunk and its branches (ascending and posterior) together form the backward (*rücklaufige*, *vordere*) root, or else that the posterior branch represents that organ and that the ascending branch is a new organ. The first of these views is supported by the fact that the ascending and posterior branches leave the stem by a common origin, the ascending trunk. On the other hand, so far as our knowledge yet goes there is no other brain in which the backward root is bifurcated, which is what this view implies.

As I have said, it is also possible to regard the posterior branch as the *rücklaufige Wurzel* (*vordere Wurzel*, *tubercule antérieur*) and the ascending root as an organ which cannot be homologised with anything yet described. This is quite a rational view to adopt, for practically nothing is yet known about the brain of the Lepidoptera. Personally I do not see any necessity for dubbing this a new organ, but if Kühnle's identification of the *vordere* with the *rücklaufige Wurzel* is proved correct, then we shall probably find it necessary to find a name for what I have provisionally called the ascending branch. An investigation of other types might yield most fruitful results.

This very small and abstruse point must be settled definitely before the study of insect brains has gone further. Unfortunately it is not possible to attack the question from a comparative standpoint, but it is essential that we should start work with our homologies correctly and clearly defined. There can be no compromise between Kühnle's view and my own, and the point at issue is fundamental. I consider that there is, at any rate, very little reason for doubting my identification of the *innere Wurzel*, which agrees with the views of previous writers.

These conflicting views may be expressed thus: according to my view, ascending trunk = common origin of—

1. Ascending branch (*vordere Wurzel*, etc.)
   = Forward root.
2. Posterior branch (*rücklaufige Wurzel*)
   = Backward root.

Kühnle, however, asserts that *rücklaufige Wurzel* = *vordere Wurzel*. If this is so, then either—

(i) Ascending trunk and ascending branch and posterior branch together = *rücklaufige Wurzel*, or else—

(ii) Ascending trunk = common origin of (*a*) posterior branch (*rücklaufige Wurzel*) and (*b*) ascending branch (not homologous with anything yet described).

I believe that the characters by which the three roots may be separated are these: The inner root (*in. r.*; *innere Wurzel,* Kühnle; *tubercule interne,* Dujardin; *Balken,* Flögel) runs backwards and inwards and terminates between the middle lobe and the inner capsule of the central body. Its end is adjacent to that of its fellow on the opposite side. It appears that this root is found in nearly all insects. The forward root (*as. br.*; *vordere Wurzel,* Jonescu; *Vorderhorn,* Flögel; anterior root, Kenyon; *tubercule antérieur,* Dujardin) runs forwards and upwards and ends "free" on the surface of the protocerebral lobes, either under the ganglion cells or else directly beneath the neurilemma. The backward root (*po. br.*; *rücklaufige Wurzel,* Kühnle) runs backwards and terminates in the posterior part of the protocerebrum without ever reaching the surface. In many insects either the forward or the backward root is absent; this has led Kühnle to believe that they are identical.

I should like to take this early opportunity of answering one objection which will probably be made to the hypothesis that the mushroom body in its typical development possesses three roots. It is well known from Kenyon's work by the Golgi method on the brain of the bee, that the axons which compose the stem branch dichotomously, and that the two branches form the two roots of the mushroom body of that insect. Now it may be urged that this division of the axon into two, which is probably characteristic of the nerve cells of the Arthropoda in general, would find its outward expression in a mushroom body with two roots. To this I may, however, reply that there is no difficulty in supposing that each fibre as it divides supplies two of the three roots; and at any rate the difficulty remains whether the ascending and posterior branches be one root or two, for the plain facts of their anatomy can hardly be disputed. Furthermore, we are already familiar with the division of the roots in the brains of other insects; now if the fibres which compose a root can be grouped in such a way as to produce a bifurcation of the root, why should not the fibres of a stem be so grouped as to supply almost any number of roots? Moreover, Kühnle has already described the mushroom body of a Phasmid, and of a Termite, both of which had three roots, though he failed to grasp the bearing of this fact upon the general question of homology. The fact of the existence of three roots to the mushroom body is not, then, a new discovery, but I trust that I have been enabled to put the homologies of the matter on a sound basis.

IV. The Central Body.

The central body of *Micropteryx* consists of two capsules; the larger of these, the outer (*ou. ca.*), is superior and posterior, the smaller or inner capsule (*in. ca.*) is inferior and anterior. They are respectively the *äussere Schale* and *innere Schale* of Kühnle. They lie together in that space in the middle of the protocerebral lobes to which Viallanes gave the name *la loge*; this contains also the ocellary glomeruli and the inner roots of the mushroom body (Pl. VIII, figs. 7–10). The space is bounded on all sides by the protocerebral lobes, and above by the tract *f*, in front by the tract *c*, behind by the tract *d*, and below by the double tract *e* (see p. 137).

Micropteryx is one of those insects in which the central body is large and the mushroom body comparatively small; that is to say, it falls within one of Bretschneider's lower categories.

The outer capsule is slightly wider than the inner. The anterior edge of each is in the same vertical plane, but the outer extends back a considerable distance behind the inner, and this posterior part of it is very thick; thus the outer capsule overlaps the inner above and behind and is much the more bulky of the two. This condition is characteristic of nearly all the insect brains which have yet been described. Turning to internal structure we find that the outer capsule stains rather more deeply with eosin or orange G than do the protocerebral lobes. There is no definite division of either capsule into bodies like the rays of a fan, a condition which has been described in the brains of various insects since the time of Dietl. The anterior part of the inner capsule is, however, divided into a number of small rounded masses arranged in no definite manner and separated from one another by bands of axons, the great majority of which pass into the outer capsule. These masses resemble to some extent the glomerular bodies (*Faserbällchen*) of the antennary lobe. The scattered neuroglia cells which lie in the space which surrounds the central body are referred to elsewhere (p. 120). There is no group of cells which can be said to belong to the central body either here or in any other insect, and we believe that the organ is a reflex centre not connected with any one motor or sensory function.

(The ocellary glomeruli, which are sometimes considered with the central body, are described on p. 135.)

V. The Bridge.

(Die Hirnbrücke—Kühnle, etc. Le Pont—Viallanes. Fibrillar Arch—Kenyon.)

The Bridge (*br.*) is a protocerebral structure found in all insect brains. In *Micropteryx* it occupies its usual position as a transverse band of axonic material on the superior side of the protocerebrum. It lies behind the nerve to the ocellus, and between the heads of the mushroom bodies (Pl. VIII, IX and X).

The bridge consists in part of Punktsubstanz; this is found at either end. The middle of the bridge is much attenuated and appears to consist entirely of nerve fibres passing from one side to the other. The organ, then, is dumb-bell shaped, the swollen ends, or "heads," being presumably centres, the narrow waist a decussating tract. The bridge is covered by some layers of ganglion cells, which appear to belong to the normal type.*

The axons of these apparently "normal" cells pass downwards to several parts of the brain. Some which proceed from the more lateral cells pass in front of, or behind, or round the end of the bridge, and enter the dorsal surface of the protocerebral lobes in a diffuse manner. Other axons pass through the heads of the bridge and so onwards to the lobes of the protocerebrum; it is probable that these give off a collateral while they are within the substance of the bridge. Other cells, again, send their axons into the bridge itself, where the fibre is lost to sight. It is probable that some of these fibres cross the middle line. The whole matter requires investigation by the Golgi method. We have, then, a number of similar cells, some of which appear to be associated with the bridge, some with the dorsal part of the protocerebrum, some, again, with both. From this I am inclined to argue that the bridge is of less importance as a physiological entity than some authorities have believed; that it is rather of anatomical than of

* In *Forficula* Kühnle distinguishes several types of cell in this region, but in every respect the ganglion cells of *Micropteryx* appear to have very little tendency to be differentiated into types.

physiological significance. Against this view is the admitted fact that the bridge exists as a distinct structure in all insect brains which have been investigated.

I can find no visible connection between the bridge and the nerves supplying the compound eyes, though a few fibres of the ocellary nerve enter the ends of the bridge. This perhaps supports Kühnle and tends to contradict the contention of Bretschneider and others who regard the bridge as a centre for the co-ordination of visual impulses.

VI. The Visual Centres.

A. *The Ocellary Apparatus.*

In *Micropteryx* paired ocelli are present, but the median ocellus is not developed here, or in any other Lepidopteron or Trichopteron. A stream of fibres, the ocellary nerve (*oc. n.*), leaves the back of the spherical chitinous capsule in which the ocellus is contained. At the point where the fibres leave the capsule there is some tendency for the nerve to break, as it is very much narrowed. The sensory cells are contained partly in the capsule of the organ, and some of them lie along the course of the nerve away from the actual ocellus, and as the nerve proceeds inwards they become less and less numerous. The nerve runs straight towards the middle line in a plane slightly anterior to the head of the mushroom body (Pl. VIII, figs. 10 and 11). When it is over the external edge of the central body it bends backwards, and at this point a few fibres leave it to pass into the protocerebral lobes. From here it passes backwards and inwards and continually gives off more and more of its fibres, so that though there is no point at which the ocellary nerve as a whole passes into the substance of the protocerebral lobes yet the whole nerve ultimately does so. A few fibres may also be seen to pass into the swollen head of the bridge.

Two small spherical bodies with rather indefinite margins are found in the space beneath the outer capsule of the mushroom body, posterior to the inner capsule and to the middle lobe (Pl. VIII, fig. 10); these are the ocellary glomeruli (*oc. gl.*) or "*tubercules du corps central*" (Viallanes). In *Micropteryx* I have been unable to demonstrate the connection between these structures and the ocellary nerve, owing to the diffuse way in which the fibres of the nerve pass through the dorsal part of the protocerebrum.

From a consideration of what is known about similar organs in other insects I do not consider that much doubt exists as to the functional connection between these small, round, deeply placed lobes and the ocellus. It is hardly to be expected that we should be able to find more than a proportion of the smaller tracts in so minute a structure as the brain with which we are dealing. Fibres pass from the ocellary glomerulus to many parts of the brain, including the paired (deuterocerebral) sympathetic system (tract *s*) and the posterior part of the antennary lobe (tract *t*).

B. *The Optic Lobes.*

Pressure of other work has absolutely prevented my devoting attention to the optic lobes (*o. l.*), and much special study of the literature would be required before I could hope to treat of them at all adequately; this would delay the publication of this paper almost indefinitely, and I have accordingly decided to leave them entirely undescribed rather than to deal with them in an inadequate manner.

VII. The Protocerebral Tracts.

Authors have frequently attempted to enumerate the tracts of fibres which connect one part of the brain with other parts, but they can only detect and describe the larger bundles and can never even attempt to follow the minute tracts which ramify in all directions through the Punktsubstanz. Such an enumeration must always be incomplete even if one part of the brain is proved to have a score of paths connecting it with other regions: and even if the Golgi method is applied to a very large number of individuals, definitive completeness can hardly be arrived at. In this present paper I make no attempt to give any complete list: I only describe a few of the more noticeable tracts which are useful either as landmarks or else as definite boundaries to regions.

The following tracts should perhaps be noticed, because they are important features of the sections in which they occur. (*a*) A wide tract of fibres arising from cells situated over the dorsal part of the protocerebrum, and passing vertically downwards in the middle line over the front of the protocerebral lobes: this tract forks below and the fibres then pass to the antennary lobe of each side, and possibly also to the tritocerebrum and the ventral parts of the central nervous system (Pl. VII, figs. 2–4).

(*b*) A tract of fibres which is the *Riechstrang*, or *Riechbahn*, of the German authors. The cells from which the tract arises appear to be ganglion cells of the "normal" type, and are situated dorsal to the protocerebral lobes and slightly behind the head of the mushroom body: the fibres pass downwards and forwards and slightly inwards, through that part of the protocerebral lobes which surrounds the space containing the central body, etc.; from here the fibres are directed downwards and outwards to the antennary lobe. Through most of their course the fibres lie in a free space. Owing to its diffuse structure, which renders it difficult to distinguish it when it is cut transversely, the lower part of this tract can only be distinguished in longitudinal section (text fig. 3, D and E, p. 129).

(*c*) A broad anterior commissure (Pl. VII, fig. 6).

(*d*) A deep commissure.

(*e*) A double ventral commissure (the *vordere und hintere Brücken der Nebenlappen unter sich* of Kühnle; Pl. VIII, fig. 9). These three are the most definite tracts which unite the two sides of the protocerebrum, though it should be remembered that the lobes are united over the greater part of their internal aspects, and that a large number of smaller tracts pass from one side to the other. These three tracts form the boundary of the "*loge*" in front, behind and below: the anterior and ventral ones lie upon the surface of the fibrillar part of the brain, the deep commissure passes between the two protocerebral lobes behind the "*loge*": the ventral commissure (*e*) arises on each side from the anterior part of the ventrolateral lobe.

(*f*) A small but distinct band of fibres which runs transversely across the upper surface of the "*loge*." This tract is the *Faserhof* of Kühnle, and possibly also the *commessura protocerebrale anteriore* of Berlese (Pl. VIII, fig. 8).

(*g*) A posterior commissure uniting the two protocerebral lobes at their most posterior part, where they overlap the tritocerebrum (Pl. IX, fig. 16).

(*h* and *i*) Tracts uniting respectively the anterior part of the middle lobe to the anterior part of the ventrolateral lobe, and the posterior part of the middle lobe to the posterior part of the ventrolateral lobe of the same side.

(*j*) A tract running from the posterior part of the middle lobe to the deuterocerebrum.

(*k*) A tract running up from the middle lobe into the deeper parts of the protocerebral lobes which lie lateral to the "*loge.*"

(*l–q*) Tracts from or to the central body.

(*l*) The two capsules of the central body are united especially along their anterior margin by fibres which make the partitions between the "*Fächer*" of the inner capsule (Pl. VIII, fig. 8).

(*m* and *mm*) Both capsules are united to the protocerebral lobes by bands of fibres which leave their anterolateral margins; the band from the upper capsule (*m*) passes upwards, that from the lower (*mm*) downwards to the ventrolateral lobes (Pl. VIII, fig. 7).

(*n*) The outer capsule receives fibres which leave or possibly enter the head of the mushroom body on its under side. This is really a part of tract *r*.

(*o*) A few fibres connect the outer capsule to the bridge.

(*p*) A few also pass from the ocellary nerve to the outer capsule.

(*q*) A well-marked band connects the antennary lobe with the outer capsule. This band enters that part of the outer capsule which lies immediately superior to the posterior part of the inner capsule (Pl. VIII, fig. 10).

(*r*) The tract which has been mentioned on p. 126 as leaving the inner and inferior aspect of the head of the mushroom body, and passing partly to the outer capsule of the central body (tract *n*), but mainly to the deep part of the protocerebral lobes lateral and posterior to the "*loge*" (Pl. VIII, fig. 12; Pl. IX, fig. 13; Pl. X).

(*s* and *t*) These tracts pass from the ocellary glomerulus to the paired deuterocerebral sympathetic system and to the posterior portion of the antennary lobe respectively.

(*u*) This consists of a few fibres which pass down from the swollen ends of the bridge to the dorsal lobe immediately below and to the tumulus (Plate X).

It is, I believe, generally true that paired organs are united across the middle line, but I am unable to say whether this is invariably the case.

Summary.

The protocerebrum of *Micropteryx* might be described in the following terms. The neurilemma, which covers the whole central nervous system in one continuous sheet, is a thin syncytium, and beneath it are found the ganglion cells and the axonic parts of the nervous system. Over the protocerebrum the layer of ganglion cells is deep, and four types can be distinguished: the normal type, the mushroom body cells, the cells of the optic lobes, and the giant cells. Neuroglia cells are found in the substance of the protocerebrum in small numbers. The tracheal system of the brain is very slightly developed. The protocerebral lobes are large, and in volume greatly exceed the other parts of the protocerebrum together. The various parts of the protocerebral lobes which have been described in other insects are all present, though *Micropteryx* presents some peculiarities, for the ventrolateral lobe and the middle lobe are each divided into anterior and posterior portions. A mid-dorsal lobe is also present, and to this I have given the name tumulus, an organ which has not been described before. The mushroom bodies are of a small, simple type, and only one is developed on each side: *the head is remarkable because of the shape, which is that of a rough sphere, without any approach to the formation of a cup.* In section it is seen to contain minute glomerular masses of nerve fibres, which are regarded as association centres: these are comparable to similar structures described in the mushroom bodies of many insects, and also in antennary lobes and central bodies. The origin of the stem is below, not within, the head of the mushroom body, and it runs downwards and forwards in a definite space; it is rod-like, and not perforated by a canal. The stem divides below in a complicated manner which does not lend itself to summarisation. I have suggested several possible homologies for the parts into which the stem divides, and my own view is that there are *three roots* to the mushroom body in this insect—an *inner*, a *forward*, and a *backward*—and that this is the typical number for the insect brain: other views are also discussed. I have also given what I believe to be the normal relations and characters of these roots; and I believe that this part, at any rate, of my paper has some permanent value. *The central body is large*, and consists of two capsules, as usual; the outer is the larger. *There is no tendency towards the division of either capsule in a fanlike manner*, but the inner capsule contains a number of minute glomerular bodies. The tracts passing from or to the central body are numerous and some of them are large. The nerves from the ocelli run inwards across the front of the head of the mushroom body and pass gradually into the substance of the protocerebral lobes, and a few fibres pass into the bridge. Two small bodies are found beneath the central body, and these are presumed to be the ocellary glomeruli of other authors, though in the brain of *Micropteryx* there is no actual evidence of their connection with the ocellary nerve. The bridge is simple and straight; its ends are rounded and consist of Punktsubstanz, and into these pass the axons of a few cells which are situated in the immediate neighbourhood; the middle of the bridge is formed of a large number of fibres which pass across the middle line. (I have underlined those characters which appear to indicate that the brain of *Micropteryx* belongs to a simple type, so far as morphological points are concerned.)

It would doubtless be interesting to compare the simple brain of this Protolepidopteron with that of other *Lepidoptera* or *Trichoptera*. This is, however, impossible, except to a very slight degree, because the only work to which we can refer is the classic paper which Flögel published in 1878, and a few lines in Berlese's text-book. Flögel dealt with the brains of a number of larvae and imagines of *Lepidoptera*, and his fullest description is that of the brain of the imago of *Cossus*. He devotes his attention to the mushroom body, which differs from that of *Micropteryx* in several important particulars. The head is developed as two cups on each side, placed in apposition to one another. The two stems which proceed downwards from these unite to form a single cylindrical stem which stains deeply and lies in a space. An inner root is given off, and this occupies the usual position of that organ; there is also a forward root which runs up to the surface of the brain and there divides in a complicated manner which is not further described; no backward root is described, but it is possible that this is represented by one of the branches of the forward root. This suggestion is an attempt to bring *Cossus* into line with *Micropteryx*, and it may well be correct, for we must remember that Flögel was hampered by the deficient methods of his time, and that he was the earliest insect neurologist in any true sense of the word.

Berlese describes the brain of *Sphinx* very shortly. The protocerebral lobes are large, the mushroom bodies of moderate size; two pairs are present, which lie one in front of the other: their stems do not unite. A mass of very large cells (*cellule maestre*) are developed behind and above the protocerebrum, and the fibres from these proceed over the front of the protocerebrum to the ventral brain by way of the œsophageal connections.

TECHNIQUE.

I. Fixation and Impregnation.

My early work on *Micropteryx* was all done upon material which had been fixed and stained by very simple methods. I became convinced that for insect neurology the employment of complicated technique was not only desirable but necessary. Accordingly I devoted the early spring of 1915 to a somewhat extensive series of experiments in staining and fixing the brains of cockroaches (*Periplaneta*), my object being to familiarise myself with some forms of technique which I proposed to apply later to *Micropteryx*. I shall describe my methods for both insects together, though some of them are only applicable to one or other of the insects.

Owing to the chitinous cuticle of insects it is necessary to take every care to ensure the penetration of the fixing fluid. Unless there is good reason to the contrary *Micropteryx* should be cut in two with a sharp knife; only the anterior end will be preserved and fixed. A cockroach, on the other hand, should be chloroformed and held between the finger and thumb, with the head resting on the thumb-nail; the epicranium should then be punctured with a small sharp knife, and also the eyes if the individual is a large one; the same knife should then be used to remove all the mouth parts and the labrum at one transverse sweep, the thumb-nail forming a block on which the cutting is done. All this can be performed without any damage being done to the brain by pressure. The head is then cut off and placed in the fixing fluid.

Fixatives. Osmic Acid (osmium tetroxide).—This is perhaps the most generally used of all fixatives, ever since the time of Viallanes, who described it as "*le réactif le plus précieux que nous possédions pour mettre en évidence le trajet des fibres.*" It has been used in strengths of from $\frac{1}{4}\%$ to 1%. Flemming's solution has also been much used, and it is probable that its results are slightly better than those given by osmic acid alone. Böttger recommended its employment for periods of about three weeks;

I cannot see that anything is gained by leaving material in it for so long a time, though it is well known that all fixatives containing osmic acid penetrate slowly even through small pieces of tissue. Forty-eight hours is quite sufficient, according to my experience. Borrel's fluid also gives good results very similar to those obtained with other osmic acid fluids. *Micropteryx* tends to float in this and other fixatives; if it cannot be caused to sink with the aid of shaking it may be lightly painted with 90 % alcohol in order to reduce the surface tension. All these fixatives are extremely useful, though they occasionally tend to shrink the cytoplasm of the larger nerve cells. The nerve fibres (axons) stand out from one another with great clearness, and in this way the sections are well suited for study: they are never distorted, and there is no tendency for the ganglion cells to break away in masses from the underlying fibrillar substance. Great care must be exercised in washing the material very thoroughly in water after fixation, or the staining will be unsatisfactory.

Formalin.—Formalin has been recommended in various rather high percentages (10 %, 20 %, etc.) by more than one worker. It is customary to leave the heads in it for some days. I anticipate that the use of formalin will soon be discontinued, for though it gives a distinctly good demonstration of the tracts of axons, there is a great tendency for the formation of vacuoles in the fibrillar substance. The result of this is that the tracts are pushed to one side and distorted. This vacuolisation is not invariable, but it constitutes a grave defect in the method, which is one that I found unreliable.

Picro-Chlor-Acetic Mixture.—I do not know to whom we are indebted for this very useful fixative; but it appears that it has not previously been used by insect neurologists. My own experience is that it is the best general fixative I have ever employed, and I trust that the workers of the future will be as satisfied with it as I am myself. It possesses very great powers of penetration, and can be relied on to fix small insects completely without decapitation or any other precautions. Insect histologists will find that it is an exceedingly fine preservative of the details of cell-structure; as far as the brain is concerned this fluid demonstrated the tracts of axons with particular clearness, and in this respect it does not fall far short of osmic acid. The nerve cells are also well preserved, and all the different types can easily be distinguished, though for a special study of the cells it is certainly best to have some material fixed for that purpose in Bouin's fluid.

Bouin's Fluid.—This fixative is only of use for a study of the nerve cells, and for this purpose it is unrivalled. It fixes material in such a way that the tracts of fibres cannot be distinguished at all, but that is immaterial provided it is realised that the fluid is essentially a special fixative.

Acetic Sublimate Solution.—This is simply a saturated solution of mercuric chloride in dilute alcohol to which a small percentage of acetic acid has been added. It has been used by other authors but there is nothing to recommend it; the tracts or bundles of axons are shown in much the same way as they are in material fixed in the picro-chlor-acetic mixture, the cells are shrunken and the different types cannot be distinguished, and the fluid has poor power of penetration.

Perenyi's Fluid.—This is a fixative with very small power of penetration, even when used hot. Even if penetration is secured the tracts of axons cannot be distinguished from one another, and the cells are swollen and matted together.

Gilson's Fluid.—The penetrating power of this fluid is so great that insects may be fixed in it whole. It is an excellent fixative of ganglion cells, and shows the differences between the types very clearly: for this purpose it is valuable but it fails entirely to define the axons.

Bichromate. — Potassium bichromate, apart from its use in the Golgi method, is quite useless as a fixative of insect nerve tissue, first because details of structure and the course of axons are not well preserved, secondly because material so fixed stains most intensely and generally with the aniline dyes, thirdly because these stains can scarcely be washed out or differentiated, and fourthly because of the great brittleness of sections which have been exposed to the action of these fluids.

The Golgi Method. — This method has been applied by Kenyon to the brain of the bee, and with it he has obtained some very remarkable results; his original paper (Kenyon, 1896, I) should be consulted for a full account of his procedure. It is almost impossible to apply it to insects which are not available for the greater part of the year because it is extremely precarious, and even Kenyon himself only obtained good results with an occasional specimen. I have been unable to use it with any success upon *Micropteryx*.

Metallic Impregnation.—The object of this method is to impregnate nerve cells and fibres with actual metallic silver and gold. The silver salt which is invariably used is the nitrate, and as it gives excellent results I have tried no other salts. The heads are dropped into a solution of this salt and kept in the dark for a period. I have devoted some time to discovering the best strength of silver solution and the period during which the heads should be exposed to its action. I find that the best results are obtained by dropping them into 1 % silver nitrate in water, and leaving them in the dark for ten days. The silver is very slow in penetrating the head, and if a 6 % solution is used there is great danger that the periphery will be blackened before the central portions are affected at all. I believe that penetration can be accelerated by keeping the whole at 30°–35° C. It is probable that the period during which the head lies in $AgNO_3$ is immaterial provided that the fixation proceeds in the dark and that sufficient time is allowed for the full and equal penetration of the silver. It was not found advisable to assist the silver to penetrate more quickly by employing an alcoholic solution of the salt. I have, for instance, experimented with a 1 % solution in 30 % alcohol, following this by the various processes which I describe below. The impregnation of the various fibres was not obtained at all, though the various parts of the brain were coloured to different degrees. In fact, the alcoholic solution of silver gave quite a pretty differential stain of no particular value, but failed utterly to produce the sweeping black lines which are what is desired.

The head, then, is fixed for ten days in 1 % silver nitrate in darkness. It is then washed. A few workers transfer it to pyrogallic acid for a day, in order to reduce the silver and leave it in the tissues in a finely divided state. I am quite convinced that this is unwise. The reduction may be done much more evenly by a method which I shall now describe. The heads are embedded, unreduced, in paraffin, fixed to the slide in the usual manner, and treated with xylol and descending grades of alcohol. At this stage the sections are sienna-brown in colour. From a low grade of alcohol the sections are moved to distilled water. (I need hardly say that if the heads or sections are brought into tap water a fine deposit of chloride will be precipitated which will completely ruin the preparations.) The slides are now placed in 1–2 % $AgNO_3$ and exposed to bright sunlight or an electric lamp for about ten minutes. After this they are washed for two minutes in distilled water and placed in 1 % gold chloride for two minutes in a bright light. They are then again washed and placed in an aqueous solution of pyrogallic acid until the reduction is complete, deposits of metal being left in the fibres. The sections are now brought up through the usual grades of alcohol, stained for a very few seconds in orange G, and mounted. These preparations do not degenerate under the cover-slip in the same manner as Golgi preparations.

This impregnation is only a modification of one introduced by Ramon y Cajal; a similar method has been employed by Jonescu.

If it is successful it gives sweeping black lines of axons running through the brain in the most diagrammatic manner. It is unfortunately almost inapplicable to so small an insect as *Micropteryx*, owing to the fact that the aqueous silver solution hardly penetrates the insect's minute neck even after decapitation. I am quite confident that this method will be found most useful in the study of the brains of insects which are large enough to admit of the brain being laid partly bare to the fixing fluid.

II. Section Cutting.

All material should be stored in 90% alcohol, rather than in a lower percentage. Excellent material may be completely ruined if the spirit in which it is kept has ever been in contact with cork, the tannin of which interferes with the action of most stains: glass-stoppered vessels must accordingly be used.

Section Cutting.—It is well known that the cutting of sections through heavily chitinous insects presents great difficulties. Much may be done to overcome this, but before discussing methods of softening chitin I should like to state my firm conviction that the one factor of prime importance is the microtome knife. In the absence of a really sharp knife no softening reagents and no care exercised during the embedding are of the slightest value. The best softening reagent, so far as my limited knowledge goes, is spirit soap (German Pharmacopœia), the use of which was first advocated by Kurt Bedau. The insects are placed in this for some days, well washed in 70 % and 90 % alcohol, and then embedded. The chitin is certainly softened by this solution, but will regain some of its hardness if it is simply embedded in hot paraffin. It appears that heat, absolute alcohol, and xylol, all exercise a marked hardening effect on chitin. It is best, then, that the head or insect should be dehydrated as much as possible in 90 % alcohol, left a short time in absolute alcohol, and cleared in chloroform. I then place it for some days in a chloroform solution of paraffin, and finally drop it into the hot paraffin of the ordinary embedding bath. Here it remains only long enough for it to attain the temperature of the bath, and is then removed in the crucible or other vessel in which the paraffin is contained, and placed under a vacuum pump; the pump will quickly remove the chloroform, most of which has by now become diffused into the paraffin. The mass may then be turned out into a mould and cooled. Terpineol has also been used as a softening reagent and it appears quite satisfactory, though I have not much experience of it.

Celloidin.—I have used this to some extent, though I no longer do so, because I find it unnecessary if spirit soap is used as described above. It cannot be relied upon to penetrate a whole insect unless thin celloidin be employed for many days.

Both with and without celloidin I have been able to obtain serial sections of the head of *Micropteryx* of considerable thinness. I have several series of 3·5 μ, which is not by any means too thin, because of the smallness and complex structure of the brain.

Practical experience teaches me that it is never safe to move either complete brains or sections from absolute alcohol to xylol or vice versa, but that an intermediate mixture of the fluids should always be employed. Unless this is done the ganglion cells will frequently break away from the axonic part of the brain.

III. Staining.

For general study sections should be stained with Delafield's hæmatoxylin, and orange G (eosin may also be used, but I think that the orange G gives better results). Such sections are excellent for preliminary work, and I always use this stain as a standard test for a fixative which is new to me.

Another valuable stain is Picro-nigrosin. This brings into special prominence the tracts of fibres which run through the brain. Counter-staining should be avoided, and also over-staining, because picro-nigrosin washes out only with difficulty in acid alcohol. The best results are obtained with material fixed in osmic acid or Flemming's solution.

Other hæmatoxylin methods have little to recommend them. The Weigert-Pal method cannot be used because it is specific for myelin sheaths, which are never found on the nerve fibres of insects.

5% Hæmatoxylin containing lithium carbonate is a stain for nerve fibres, but picro-nigrosin gives similar though more distinct results. Staining with Mallory's hæmatoxylin is very strongly recommended by Kenyon and by Altens. The process is complicated. At first sight the stain appears much too general to be of use. Every tissue is stained a heavy dark blue, and differentiation in acid alcohol is useless. I have discovered that the sections may be quickly differentiated in a solution of sodium bicarbonate in distilled water. The stain becomes bright sky blue and most of the tissues are partly decolorised. The nerve fibres retain the stain. This complicated method produces results which are not really superior to those produced by staining with picro-nigrosin. The blue colour appears to be permanent. The cytoplasm of the giant cells retains even more of the stain than do the nerve fibres. The ordinary small ganglion cells are very much decolorised in the alkali.

Mallory's Anilin Blue.—This has been used by Bretschneider in his work on the brain of *Periplaneta*. The method is one of great complexity, especially with the addition of the modifications which he introduces. The results are extremely beautiful, but most workers will probably consider them hardly worth the trouble and time expended on them.

Mann's Stain.—I am much indebted to Dr. D. Keilin for insisting on my giving a trial to this stain, which will be found of great value. I find it best to stain first, lightly, with Delafield, but this is not necessary or desirable except for nerve cells; the stain is widely known to insect histologists, and is strongly recommended to neurologists. It is seen at its best when applied to material fixed in the fluids of Bouin, or Gilson, or in the picro-chlor-acetic mixture; it should not be used upon osmic acid preparations.

I have tried several stains which have proved more or less useless, and I mention them below in order to save others from wasting time upon them.

METHYLENE BLUE and METHYL VIOLET.—It appears that the cells have little affinity for these stains. This is remarkable when it is remembered to how large an extent methylene blue has been used as a vital stain for the nervous systems of the Arthropoda.

VAN GIESON'S STAIN.—This stain is useless because it colours all the soft parts of the section a uniform pink colour, without any of the differentiation which it gives with sections of the tissues of Vertebrates.

Various preparations of CARMINE were tried, because of its historic interest as the only stain used by the workers of thirty or forty years ago. It appears to have singularly little affinity for any part of the brain of *Micropteryx*.

The stains on which I place most reliance are Delafield's hæmatoxylin with orange G as counter-stain for preliminary study, picro-nigrosin and the reduced silver and gold method for the study of the course of nerve fibres, and Mann's stain for the nerve cells.

IV. NOTE.—Some of the fixatives and stains to which I have had reason to refer are not very well known, and it will perhaps be helpful if I give their compositions. The *picro-chlor-acetic* mixture is 1 % picric acid in absolute alcohol, 6 parts; chloroform 1 part; formalin (40 %) 1 part; glacial acetic acid $\frac{1}{2}$ part. Fix twenty-four hours, then three days in 90 % alcohol. *Borrel's fluid* consists of osmic acid (Os O4) 1 gm.; acetic acid 10 c.c.; platinum chloride 1 gm.; chromic acid 1·5 gm.; and distilled water 175 c.c.

The *spirit soap* which is recommended as a reagent for softening chitin is one of the official preparations of the German Pharmacopœia: 6 gms. of olive oil are saponified with 7 gms. of a solution of potassium hydroxide; to this is added alcohol 30 gms., water 17 c.c. (Kurt Bedau, Zeitschr. f. wiss. Zoologie, Vol. 97, p. 418, 1910–11).

Of the stains the following should perhaps be described. The *picro-nigrosin* I used was made up as follows: 1 vol. 1 % aqueous solution of nigrosin; 9 vols. saturated aqueous solution of picric acid. The fact that the various authors who have tried this stain give conflicting accounts of its value is due to the fact that there is no standard composition for it. *Mallory's hæmatoxylin.*—The stain consists of hæmatoxylin crystals 1 gm.; chloral hydrate 10 gms.; 10 % solution of phosphomolybdic acid in water 1 c.c.; distilled water 100 c.c. The sections are mordanted in 5 % copper sulphate solution for twenty-four hours, washed in tap water, placed for $\frac{1}{4}$ or $\frac{1}{2}$ hour in the stain diluted with four times its volume of distilled water, rinsed and carefully decolorised in a solution of sodium bicarbonate in distilled water. Bretschneider's application of *Mallory's anilin blue,* with some slight modifications of my own, is as follows: Delafield's hæmatoxyl 1 hour, or until the nuclei are faintly stained; wash; eosin twenty minutes; wash in water; 1 % phosphomolybdic acid two minutes. Mallory's stain one minute; wash, dehydrate and mount. The composition of the Mallory's stain is anilin blue (water-soluble) $\frac{1}{2}$ gm., orange G (water-soluble) 2 gms., oxalic acid 2 gms., distilled water 100 c.c. *Mann's stain;* 1 % aqueous sol. methyl blue 35 c.c., 1 % aqueous eosin 35 c.c., water 100 c.c. Stain ten minutes or longer, for it is impossible to overstain, and then wash in alcohol containing 1 % of pyridin, watching the process of decolorisation under the microscope; with practice the right degree of decolorisation can easily be obtained.

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A very complete bibliography is given by Kühnle. It is only necessary for me to give a list of the authors and papers to which I have referred.

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ABBREVIATIONS USED.

In every case the same abbreviations are used in the Plates as in the text figures.

The letters *a*, *b*, *c*, *d*, etc., refer in all cases to tracts.

a, *b*, *c*, *d*, etc. (p. 136).
as. br. = ascending branch (= forward root) of mushroom body.
a.s. = axonic substance = fibrillar substance.
as. tr. = ascending trunk of mushroom body.
br. = bridge.
br. hd. = head of bridge.
d. l. = dorsal lobe of protocerebrum.
dm. = deuterocerebrum (= antennary lobe).
d. sy. = deuterocerebral or paired sympathetic system.
ei. = Einströmmung (see p. 120).
g. c. = ganglion cells of the "normal" type.
gi. c. = giant cells.
hd. = head of mushroom body.
in. ca. = inner capsule of central body.
in. r. = inner root of mushroom body.
l. l. = lateral protocerebral lobes.
lo. = "la loge" of Viallanes.
mb. = mushroom body.
mb. c. = cells of mushroom body.
mi. l. = middle lobe.
mi. l. a. and *mi. l. p.* = anterior and posterior portions of middle lobe.
mm. = tract *mm.* (p. 138).
mo. n. = motor antennary nerve.
ng. = nuclei of neuroglia cells.
nl. = neurilemma.
nn. = nuclei of the neurilemma.

o. c. = cells of optic lobes.
oc. gl. = ocellary glomerulus.
oc. n. = ocellary nerve.
o. l. = optic lobes.
ou. ca. = outer capsule of central body.
pc. l. = protocerebral lobes.
po. br. = posterior branch (= backward root) of mushroom body.
s. n. = sensory antennary nerve.
st. = stem of mushroom body.
sw. hd. = swollen head of ascending branch.
sw. st. = swollen foot of stem.
tm. = tritocerebrum.
tr. = tracheal tubes.
tu. = tumulus.
vl. l. = ventrolateral lobe of protocerebrum.
vl. l. a. and *vl. l. p.* = its anterior and posterior portions.

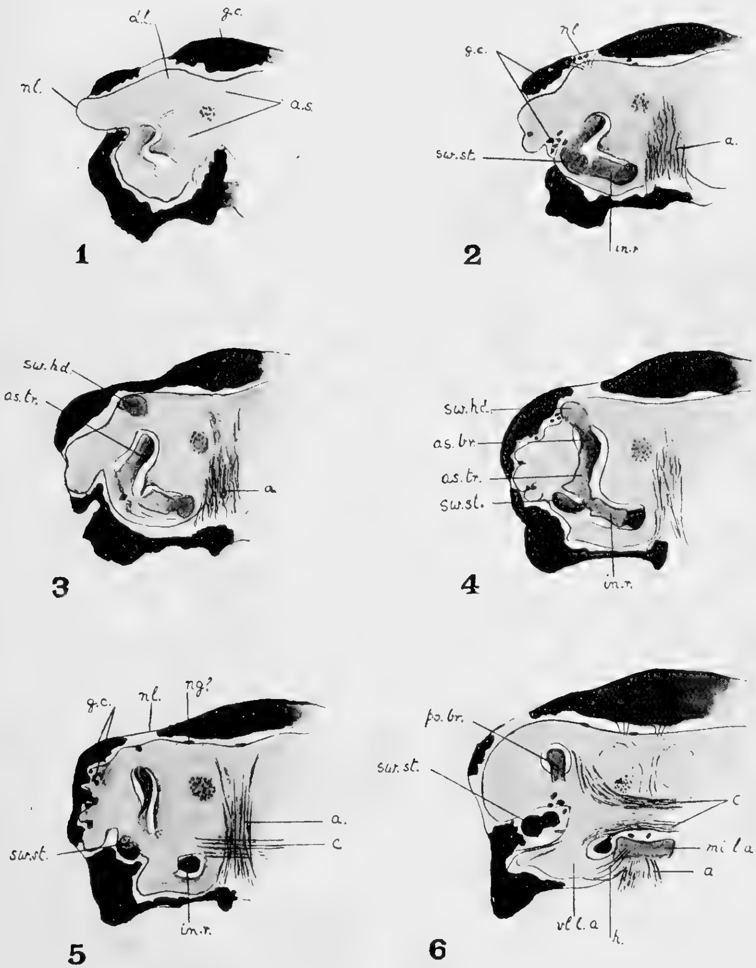
Explanation of Plates.

Plates VII to IX (figures 1 to 16) represent a series of vertical transverse sections through the protocerebrum of *Micropteryx*, partially diagrammatic. Each figure represents a successive section 3·5 μ thick, except that single sections are omitted between figures 6 and 7, 9 and 10, 14 and 15, and 15 and 16.

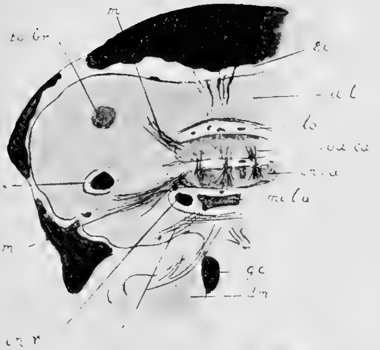
The neurilemma is shown as a black line, the cells of the mushroom body (*mb. c.*) and those of the optic lobes (*o. c.*) by black masses, and the normal ganglion cells (*g. c.*) by dark grey, except where one or two occur alone, in which case they are represented as individual black dots (*e. g.* fig. 5). Giant cells (*gi. c.*) are always drawn individually. Axonic substance is shown pale grey, except the stem of the mushroom body, which stains heavily and is coloured dark, and certain other parts of the protocerebrum which are shown in medium grey because they stain slightly more intensely than other parts. Bands of fibres are shown as dark lines when they are striking features of any section.

The upper part of each figure is dorsal, the lower ventral.

Plate X (fig. 17).—This plate is from a thin section, hence the amount of free space among the ganglion cells. The drawing re-



BUXTON: PROTOCEREBRUM OF MICROPTERYX.



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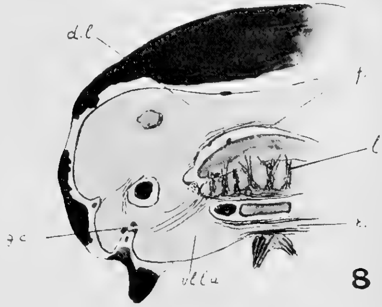

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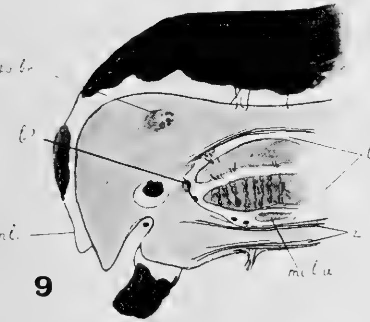

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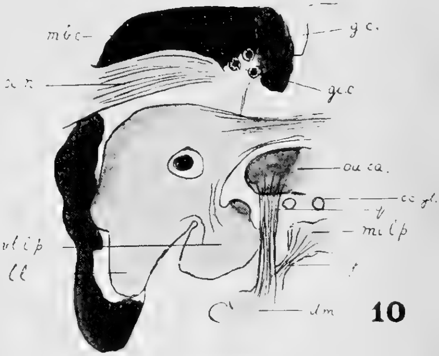

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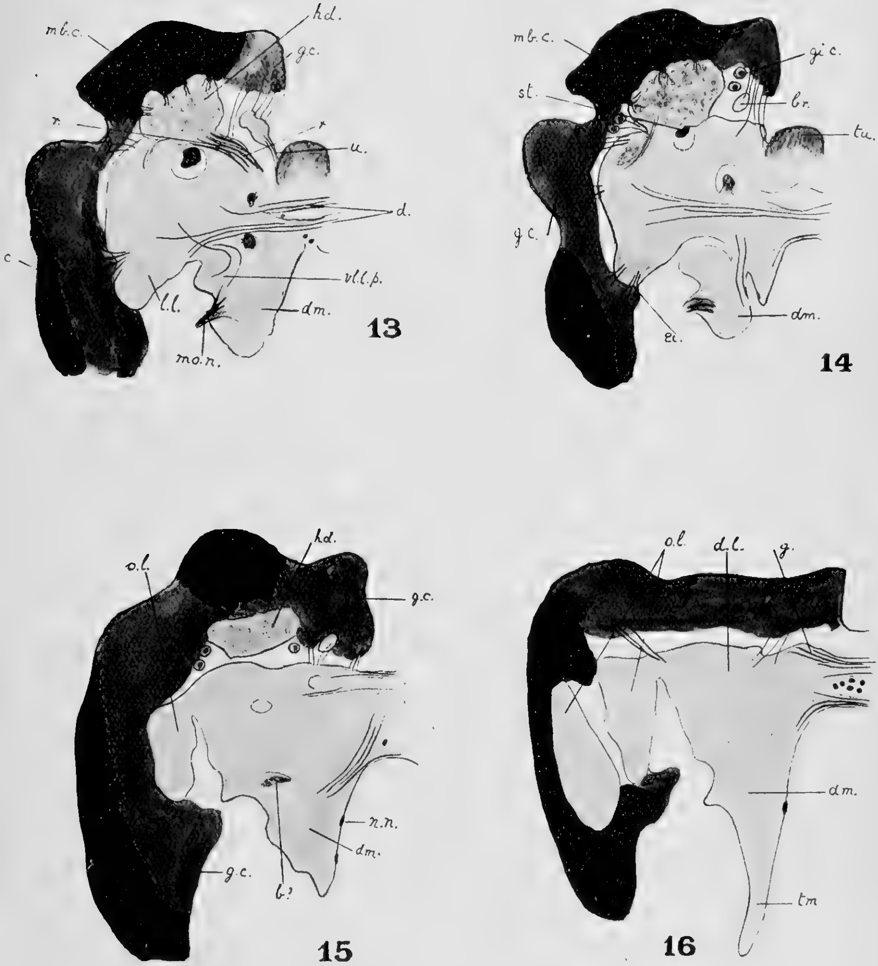
BUXTON: PROTOCEREBRUM OF MICROPTERYX.



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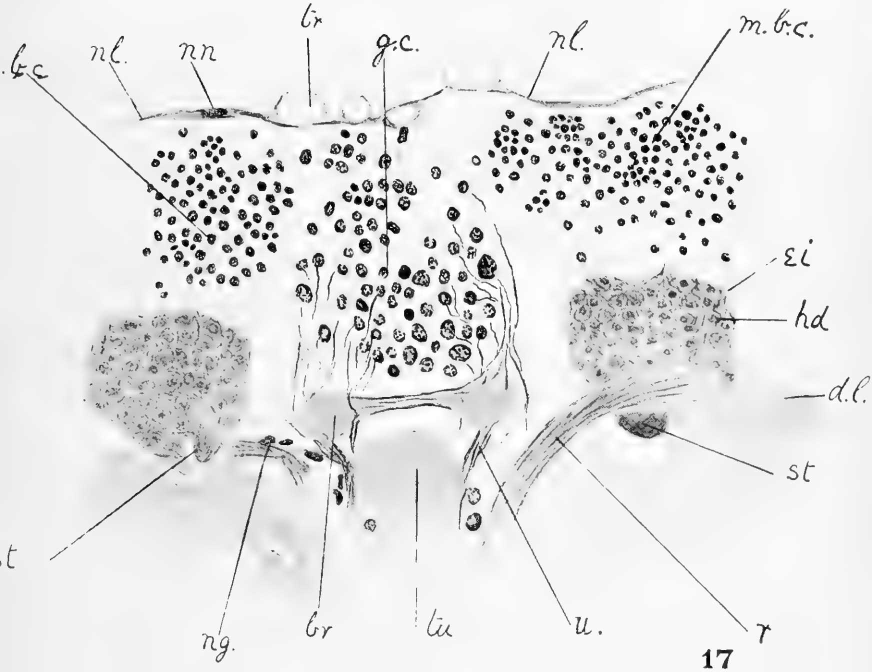


BUXTON: PROTOCEREBRUM OF MICROPTERYX.

presents the upper part of the protocerebrum (*cf.* fig. 12), and shows mushroom body cells and normal ganglion cells lying in a loose mass beneath the neurilemma (*nl.*), which here contains tracheae and characteristic elongate nuclei. The minute glomerular bodies on the head of the mushroom body are indicated, and also the large tract *r*, typical of Fasersubstanz, and the dorsal lobe, an example of Punktsubstanz. Note the mass of irregular neuroglial nuclei beneath one head of the bridge.

The plates are in every case drawn with the aid of a drawing eyepiece.

VI. *Some Notes on Butterfly Migrations in British Guiana.* By C. B. Williams, M.A., F.E.S.

With Sketch Map.

[Read March 7th, 1917.]

The whole problem of the migration of insects, and of butterflies in particular, is one of great interest, and, at the same time, one about which we have so little data that it is almost impossible at present to make any generalisations. With the exception of records of such well-known migratory insects as the locusts, most of the published accounts are fragmentary, inaccessible or isolated records for a country by passing visitors. From the records relating to butterflies almost the only common fact which emerges is that migrations are particularly abundant in the *Pieridae*, records in this group being known from all parts of the world.

I have recently spent a few months in British Guiana, and have been fortunate enough to observe two migrations of the yellow Pierid, *Callidryas eubule*, one of which lasted for at least ten days. I also questioned a number of residents of the district about migrations, which when large are noticeable even by the non-entomological public, and find that they are a phenomenon of regular occurrence, and that almost every one who has resided there for any length of time has seen the clouds "of yellow butterflies all flying steadily in one direction." Most of the accounts were too vague to be of any value, especially with regard to details; but from among them I was able to get some in which the locality and the direction of flight was given with sufficient appearance of accuracy to make it seem worth recording. In addition to these I have given extracts from a few published accounts of migrations in British Guiana, chiefly from local publications which are not readily accessible to the entomologist.

The climatic conditions near the coast of British Guiana, to which district most of the records refer, consist of two wet and two dry seasons each year. In general, February to April is more or less dry; May to the middle of August wet; the end of August to October the driest season; and November to February again wet. Further in the interior the second dry season is lost, and there is only one wet and one dry season each year.

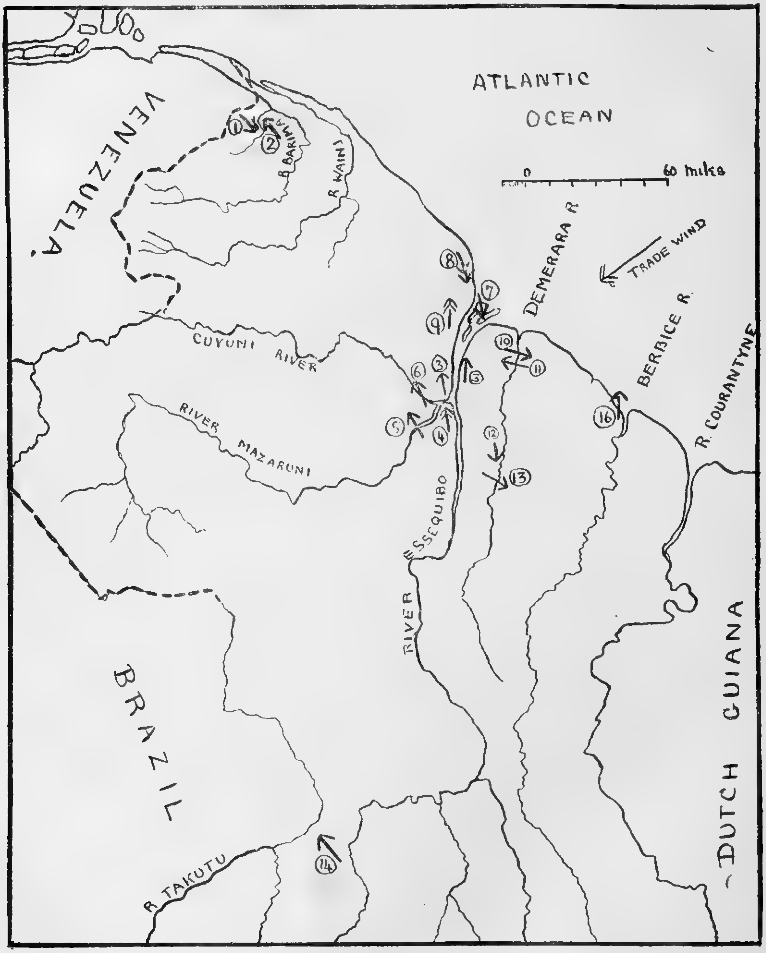
There are given below particulars of sixteen different migrations (really more, as some of the records refer to a number of similar migrations seen in the same locality in different years). All except one of these refer to *Callidryas eubule.* Two are from my own observations, nine are collected from residents and are, I believe, quite reliable, while five have been previously recorded. The exact locality and direction of all, except one, will be found indicated on the accompanying map.

1. This migration I saw in the North-west District of British Guiana within a short distance of the Venezuelan border. Most of the observations were made on the River Aruka, between the junction with the Barima, of which it is a tributary, and Issororo about six miles further up the Aruka. The junction of the two rivers is about twelve miles in a direct line to the coast, and about nine miles from Venezuela. The district is chiefly a vast forest swamp, below the high-tide sea level, with here and there a small rounded or flat-topped hill, one or two hundred feet high.

The migration consisted almost entirely of the yellow Pierid *Callidryas eubule,* interspersed with a very small proportion of at least three other species which I was unable to catch; one of them, a large, dark, Papilio-like insect, may possibly have been *Cydimon* [*Urania*] *leilus*, a day-flying moth which is not uncommon in the district, and which has been recorded as having migrations of its own.

I first became aware of the migration on August 1st, 1916, although three days before specimens had been noticed in the district. It was then two and a half months after the beginning of the first wet season. The migration was only at times really conspicuous and never attained a density which could without exaggeration be recorded as a " thick cloud." On many days only careful observation indicated that anything unusual was occurring. In order to get a comparative idea of the density of the migration a distance of about two hundred yards was estimated from the observer in a line across the direction of flight (in close spaces this sometimes had to be reduced to one hundred yards or less), and the number of butterflies crossing this line per minute was counted.

It will be best to give the actual observations taken at the time.



1*st August*.—The yellow butterfly, *Callidryas eubule*, was migrating in large numbers to-day. They were flying in an easterly to south-easterly direction almost across what is, for this district, a rather strong wind. They were first noticed crossing the River Aruka about half a mile from Issororo. At 1.10 p.m. I counted in a little over five minutes sixty-two *Callidryas*, one orange butterfly of about the same size, one smaller yellow species, and two dark Papilio-like insects crossing a space estimated at two hundred yards (moving as our boat moved). They became rapidly more common, and from 1.30–1.35 I counted three hundred and fifty crossing the same estimated distance. They were then for some distance a little less common, but at the junction of the Aruka and the Barima, where we arrived at about 2.15, at least a hundred and fifty per minute were passing. Below this the flight thinned out, and at Morawhanna, four miles below the junction, scarcely any were to be seen. The course of the rivers is far from straight, but the flight must have been at least five miles across. About one in a hundred of the butterflies was a bright orange species, and a smaller proportion of the dark Papilio-like species; this latter may, however, have been more common, as it was difficult to see at a distance.

Catching butterflies while standing up in a small boat is neither easy nor safe, but I managed to net two specimens, one male and one female.

2nd August.—We left Morawhanna at 11.30 a.m., and were in the migration practically the whole way back to Issororo, where we arrived at 2.30 p.m. The butterflies were occasional near Morawhanna, almost as common as yesterday at the junction of the Aruka and Barima, and frequent all the way up until near the end, when a very heavy shower sent both us and them into shelter. Even in the thinner parts ten to twenty per minute were crossing every two hundred yards. To-day I caught five specimens, four males and one female.

3rd August.—At ten o'clock this morning the yellow butterflies were flying at the rate of two or three per minute past the house (in a clearing about one hundred yards wide and about half-way up a hill about two hundred feet high). At 10.15 none were to be seen; at eleven o'clock they were again noticed for about five minutes; at 12.30 they were still passing over three or four per minute, and again at two o'clock they were seen occasionally in intervals between showers. At 3 p.m. a few more were noticed. I caught to-day one more specimen, a female.

4th August.—At 9.30 a.m. six or seven *Callidryas* were seen passing south-east over the house; about 11 a.m. they were noticed whenever the sun was shining; between 11.35 and 11.40 thirty-four passed over on a hundred yards line. At 1 p.m. two or three per minute were flying rapidly at the foot of the hill, all going south-east. At 2 p.m. they were still passing, but none were seen after three o'clock. One caught to-day was a male.

5th August.—Very wet, 1·38 inches of rain; no butterflies seen.

6th August.—They were first noticed to-day at 11 a.m.; from 11.30–11.35 sixty-three passed over the garden, *i. e.* thirteen per minute on a hundred yards line.

7th August.—The butterflies are still migrating. At 9.30 a.m. six or seven per minute were passing the house; at 10.15 a.m. eight a minute were passing on a hundred yards of garden; and again at mid-day and at one o'clock they were still flying. One specimen captured to-day was a male.

8th August.—At 11.15 a.m. they were again noticed migrating. The sun seems to make a great difference to the flight. I started counting at 11.16 a.m., and in the first minute eight passed; then the sun went in, and in the next four minutes only three were seen; in the first two minutes of sunshine after this fifteen passed. Do they follow the patches of sunlight, or settle when a shadow comes? The former does not seem possible, as they have always been flying across the direction of the wind. At 1.15 occasional specimens were seen crossing the river, but they were far apart; at a casual glance it might not be noticed, but every ten seconds or so one would come into view going full speed south-east.

9th August.—The butterflies were still in migration, but only occasionally in intervals between heavy showers.

10th August.—The butterflies were plentiful to-day, crossing the river at Issororo at least twenty to thirty per minute on two hundred yards line. Half a mile between Issororo they thinned out and remained at three or four per minute right down to the river junction; below this to Morawhanna only very few were seen. I made an attempt to-day to estimate the speed at which they were flying; previously I had found it impossible to overtake them even when on a clear footpath, and had considered their speed as at the very least nine miles per hour. The river now gave a good opportunity of testing this, as they were passing directly across it and could be timed from one side to the other with ease. The river was at least a hundred and fifty, and possibly two hundred yards wide. Three butterflies were timed and took twenty, twenty-four and twenty-six seconds to cross. Taking twenty-four seconds as an average and a hundred and fifty yards as the distance, this gives twelve miles per hour (if the river were two hundred yards wide it would be sixteen miles per hour). This is, I think, a not unreasonable estimate.

In flying the insects kept close to the surface over which they were passing; over the forest they seemed never to be more than a few feet above the tops of the trees, and in any but the smallest clearing they descended rapidly to the ground and flew between small bushes and trees about four to eight feet up. On crossing the river they kept still lower, being seldom more than three feet above the water and occasionally almost touching it.

Any attempt to estimate the number of butterflies in a flight of this kind must of necessity be only an approximation. Taking ten butterflies per minute per two hundred yards as an average, this gives 5,400 per hour per mile, or 135,000 for a day of five hours on a front of five miles. At the rate noted at the junction of the Aruka and Barima on the 1st August (150 per minute) 84,000 would pass in a single hour on a front of one mile.

On the 10th August I left the district, and was later informed by Mr. A. A. Abraham, Manager of the Government Experimental station at Issororo, that the butterflies disappeared shortly after my departure.

The chief points of the above migration may be summarised as follows: (1) The migration lasted at least ten days; (2) both males and females were represented, the former predominating (my total captures were seven males and three females). (3) They flew constantly in a south-easterly direction at a speed of about twelve miles per hour across the prevailing north-east trade wind.

2. In the middle of October 1916 Mr. Abraham wrote to me from Issororo to say, "Since my last note to you [end of September] I have observed that the butterflies are returning at the same rate and numbers to the bank of the river from which they migrated." This is a particularly interesting record, as it confirms several other records of migration in opposite directions in the same locality about which I had been doubtful.

3. In September 1916 I observed a very diffuse migra-

tion at Bartica at the junction of the Essequebo, Cuyuni and Mazaruni Rivers, and from there down towards the mouth of the Essequebo. On the 11th September I noticed that all the *Callidryas* passing over the garden of the house where I was staying (at H. M. Penal Settlement on the opposite bank of the Mazaruni to Bartica) were flying in the same direction, towards the N.N.W., at full speed. They were not common, and in twenty minutes (12.40–1 p.m.) I only counted thirty-nine, *i. e.* about two a minute; during that time not a single one was seen to settle, or fly in any other direction. They were still passing over about half an hour later, but after that the usual afternoon rains came on and they were not seen again that day. There was a slight east wind blowing at the time. On the following day (12th September) at Bartica, several were seen, again all flying full speed N.N.W. On the 13th September I descended the Essequebo to the mouth by steamer, and during the early part of the journey *Callidryas* were flying N.N.W. at the rate of four or five a minute on a two hundred yards line. There was then practically no wind. About 10.30 a.m. the north-east trade wind became stronger, and the flight changed to a westerly direction (almost directly across the river instead of down it). This would be the natural resultant of a N.E. breeze on an attempted flight in a N. or N.N.W. direction.

4. Mr. Withers, Manager of Hills Estate, Bartica, who has resided in the district about seven years, tells me that he has many times seen the yellow butterfly migrating, sometimes for days together, *always in a N. to N.W. direction.* These flights, he says, usually occur in October.

5. Mr. Frear, Chief of H. M. Penal Settlement, tells me that about the beginning of August 1916 there was a small flight about ten miles up the Mazaruni River flying north-west. This would be about the same time as I saw them at Issororo, flying in an exactly opposite direction.

6. Mr. Cameron, Acting Chief Engineer of the Government Steamer Service, tells me that on the 8th September, 1916, he saw a small number of yellow butterflies at Camaria on the River Cuyuni, about eight miles above the Penal Settlement, all flying north-west.

7. H. W. B. Moore, in "Timehri," the Journal of the Royal Agricultural and Commercial Society of British Guiana, 3rd Series, vol. ii (1912), p. 405, says: "In July . . . I observed thousands of *Callidryas eubule* . . .

flying across the Essequebo River from Wakenaam to Hog Island and Great Troolie Island [all near the mouth of the river]. They were flying chiefly in ones, but twos and threes and higher numbers were not infrequent, whilst once in a way a flock of twelve to twenty could be counted. The great majority were males. . . . Soon after Kurubaru Islands were passed the butterflies were seen to be flying from the mainland towards Wakenaam. Going on towards Aurora and Suddie on the west bank at the mouth of the river they were seen flying upstream, following, it seemed, the direction of the wind." All the directions mentioned are between south and east.

8. Mr. Marshall, who was for many years Manager of a sugar plantation near Suddie, on the west bank of the mouth of the Essequebo, tells me that migrations of the yellow butterfly are a regular phenomenon there, chiefly in May and June, rarely July, always flying from the N.W. towards the S.E., which is across the prevailing N.E. wind. They come from the north-west, and frequently reach the coast just north of the Suddie; there they turn southward along the coast to the mouth of the Essequebo and then cross over *via* Tiger Island, Wakenaam, Leguan, etc. It must have been one of these migrations which Moore describes above (7).

9. Mr. Humphreys, for many years Manager of a sugar plantation at Anna Regina, which is not far from Suddie, says that he has frequently seen migrations going in a northerly direction down the Essequebo River and up the Coast. This is in the exact opposite direction to the last recorder, but there is, I think, no reason to doubt that both are possible. Mr. Humphreys made the further interesting remark that the butterflies were sometimes in a long, narrow band, only ten to twenty feet wide.

10. Mr. Rodway, in "Timehri" (see above), 3rd Series, vol. i (1911), p. 131, says: "*Callidryas eubule* . . . is noted for its extensive flights; for hours they have been seen passing over the Demerara River going east, probably billions in number, and all males. Whence they come and whither they go is a mystery. Their food-plants [*Cassia*] are common everywhere, and there does not appear to be any scarcity of females." He refers again to this migration in "In the Guiana Forest," 2nd edition, 1911, p. 122, but with no further particulars.

11. Mr. Peterkin, of the Department of Agriculture,

tells me that about 1906 he saw a migration of some thousands of yellow butterflies crossing the Demerara River from Plantation Diamond to Plantation Wales, that is, from the east to the west bank about six miles from the mouth of the river. They were flying with a strong wind behind them.

12. The Rev. Mr. Salmon tells me that at Wismar (about sixty miles up the Demerara River) at the beginning of August 1916 he saw a "procession" of yellow butterflies between his house and the river. They were flying in groups of ten to twenty, with a short interval between each group. The flight was first noticed at mid-day and lasted for several hours after this. It might have already been proceeding for some time. They were flying approximately from N.N.W. to S.S.E.

13. Messrs. Bancroft and Ward described to me a migration that they had seen a few days before, about the 20th September, 1916, at Murirato, about ten miles above Wismar on the Demerara River. The butterflies were all flying from the left to the right bank of the river, that is, from west to east.

14. Richard Schomburgk, in "Reisen in Britisch Guiana," Zweite Theil, Leipzig, 1848, p. 157, describes a migration of yellow butterflies which flew from S.E. to N.W. in the interior of British Guiana near Pirara about the 13th September, 1842. The flight lasted the whole day, and at mid-day and just before sunset the butterflies settled in countless numbers on the patches of sand at the edge of the river. According to the natives they were the butterflies which came from certain caterpillars and chrysalides which they readily ate.

15. Both Moore (*l.c.*) and Rodway ("In the Guiana Forest," 2nd edition, p. 122) refer to a record of a migration by Robert (not Richard) Schomburgk, of which, however, I have been unable to trace the original. Moore says it was observed by Sir Robert Schomburgk "on the 18th of October, 1838, when going up the Essequebo, and it continued crossing the course of the river for nine hours and a half, during which time his boat ascended nine miles. A thousand million is not too high an estimate for the number of individuals in the swarm."

16. This last record relates not to *Callidryas eubule*, but to another Pierid, *Appias margarita*, a small white species. Mr. A. Leechman, in the "British Guiana Handbook,"

1913, p. 137, writes that he has "once witnessed a flight of white butterflies (*Appias margarita*) on the lower left bank of the Berbice River which lasted for over three days, and could only be compared during the whole of that time to a heavy snowstorm. And the extraordinary thing was that they were all flying directly out to sea. Mr. Leechman has informed me that this occurred in April 1909.

It is difficult even from the above records to get any indication of what is happening. On the real problem, why the migration takes place, there is still no light, and many more correlated observations must be made before there can be any hope of solving it.* There are, however, a few points to which attention might be directed. In the first place, there are here two general directions of migration for *Callidryas eubule*, roughly from the north-west to the south-east, and *vice versa*. There is as yet no record of a migration in a north-east or south-westerly direction. The prevailing wind is the north-east trade wind, so that the migrations were across the wind. It is impossible to say if this is the real determining factor in the direction of the migration or not.

Secondly, all the migrations of *Callidryas* in which the date is recorded took place between May and October.

Thirdly, it seems possible to distinguish between several different types of migration. At least one can make a rough but convenient grouping into three classes. (1) The thick cloud, "like a snowstorm," a case which immediately attracts the attention of the ordinary individual and is most frequently recorded. (2) The diffuse migration, which may vary from distinctly noticeable to so attenuated that only a close observer would realise that anything unusual was happening. There is, of course, no strict line of demarcation between this and the last, and the edge of a "cloud" migration would probably be diffuse. A diffuse migration, however, can exist unaccompanied by a cloud. (3) A particularly interesting form is the "ribbon" migration, or "procession," in which a narrow band of butterflies a few feet or a few yards wide flies across the country in the direction of its length. The edge of such a migration is well defined. In this connection it might be mentioned that, even when not on migration,

* British Guiana would seem to be a promising field for such investigations, but they must be extended over a series of years, with a number of competent observers stationed over the country.

Callidryas eubule has a habit of flying round and round a field in short strings of about half a dozen almost head to tail, and closely following each other's movements. This habit may throw some light on the formation of the ribbon, but does not explain the movements of the leader.

Finally, we have the extremely interesting question of the sexes represented in the migration. Rodway records that all that he saw were males, but I understand that this was from observing their colour whilst in flight. The male and female of *Callidryas eubule* differ distinctly in colour and markings, and perhaps any one very familiar with this species could tell them apart in this way. I found it impossible to do so, and could only tell the sex after capture. My specimens were, as mentioned before, seven males and three females. It does seem, then, to be a general rule that the males predominate, and this is confirmed by observations in other parts of the world. This branch of the subject seems to me to be of fundamental importance, for if the migrations consist so largely of males, what becomes of the corresponding females? Mr. Rodway has bred this species and finds the two sexes to be more or less in equal numbers, and this is the general rule for other insects except in rare cases, such as parthenogenetic reproduction, which seems scarcely feasible here. There remains the possibility of the males developing more rapidly and emerging from the chrysalides earlier than the females, but there is no direct evidence for this, and against it is the fact that, except perhaps at the beginning of the first wet season, the successive broods of insects in the tropics are ill-defined and usually overlap considerably. It may be contended that the females are less fitted for long flights, being heavily laden with eggs. Even if this is so, we are left with the question, "Why, then, do the males migrate?"

VII. *The condition of the scales in the leaden males of* Agriades thetis, *Rott., and in other Lycaenids.* By E. A. Cockayne, D.M., F.R.C.P., Temporary Surgeon, R.N.

[Read March 7th, 1917.]

Plate XI.

The peculiar colour of the leaden males of *Agriades thetis*, many of which were taken near Folkestone in 1916 and occasional specimens in previous years, led me to think that a microscopical examination of their scales might be of considerable interest.

In the normal male *thetis* the wing is covered with lines of smoky scales, short and broad, which have strong longitudinal ribs and well-marked cross striations. Alternating with the rows of dark scales are rows of longer scales, which I call for convenience the "colour scales." These are also longitudinally ribbed, but have weaker cross striation, and are yellow by transmitted light and brilliant blue by reflected light. The blue colour has generally been regarded as an interference colour due to the cross striae and not a pigmentary colour, but H. M. Sims (Canadian Entomologist, 1915, p. 161) considers that it is dependent on a fluorescent dye. In either case the dark scales serve to absorb any light which passes through the blue scales, and to prevent the coloured scales on the underside of the wing from being visible on the upperside.

In addition to these two kinds of scales small colourless androconial scales are present in abundance. In the leaden males of *thetis*, the smoky scales and androconia are of normal shape, size and colour, but all the colour scales are very thin, and have their distal part rolled up to form a tube. By reflected light the curled-up edges and tubular ends of these scales look silvery, and under a low power of the microscope appear as ghostly triangles overlying the dark scales, which are much exposed to direct view and give the leaden colour to the wings.

Examined under a high power ($\frac{1}{12}$ inch oil immersion) it is seen that they are quite colourless by transmitted light. The longitudinal ribs are present, though often crinkled, but no cross striae are present with the exception of a few imperfect ones at the extreme base of the scales.

A few scales were found in which the lateral margins were turned up, and in which very pale yellow dye was present, but no cross striation. Unfortunately they were mounted in balsam, and I could not see whether they were blue by reflected light. If a scale of this nature could be isolated and examined unmounted it would settle the controversy as to the cause of the blue colour in the blue Lycaenids.

Near the base of all four wings in both the specimens examined, and along the costal margin of the right forewing in one of them, normal thick blue scales were found with the abnormal ones.

Some of the scales on the fringes were thinner and more hair-like than is usual, but the scales on the undersides of the wings were all quite normal. The peculiarity can scarcely be due to any pathological condition acting upon the scales from without. If this were so the neighbouring dark scales and androconia would not escape, nor would the scales of the underside be perfect.

No injury, nor any infection by a pathogenic organism, would be likely to affect the upper surfaces of all four wings in the uniform and complete way in which it is almost always affected in these leaden *thetis*. It is much more likely to be dependent on some inborn error of development.

The following observations of Mr. G. T. Bethune-Baker lend strong support to this view. According to this author the blue scales in *Polyommatus dolus* var. *vittata* are very similar to the abnormal scales of the aberration of *thetis*. I quote the description of these in his Presidential Address (Proc. Ent. Soc. 1913, p. clviii): "An extraordinary character, however, obtains in the ordinary blue wing scales, the whole of which are curled round so as to form more or less short tubes; the process appears to be that each side of the scales turns over, and occasionally they meet thus in the centre, but more generally one side will overlap the other and so form a more or less perfect tube; by this I mean that the basal and apical ends remain open—a tube that is sealed at each end naturally ceases to be a tube, becoming a cylinder."

This description agrees very closely with the condition met with in the "colour scales" of the leaden *thetis*, but in *dolus* the tubular scales are blue and presumably retain their cross striation or the fluorescent dye. Similar rolled-up scales have been described by Mr. Bethune-Baker in the "*Menalcas*" group, in which the wing colour is much whiter than in most Lycaenids.

I wrote to Mr. Bethune-Baker, who has examined microscopically several leaden aberrations in his collection, and has very kindly allowed me to publish his notes on the condition of the scales in them. He has examined one *Lycaena arion*, one *Polyommatus icarus*, two *Lycaenopsis* (*Celastrina*) *puspa*, two *Lycaenopsis planta*, and a single specimen each of three species of *Tajuria*, an exotic genus.

In the *arion*, which is a dull bluish colour, the scales are only curled up in a small percentage, in the majority being merely thin and inclined to buckle at the edges. In the *icarus*, which is greyer though not extremely leaden coloured, the scales are thinner and more curled than in the *arion*.

In all three species of *Tajuria*, which are much more leaden coloured, the scales are rolled upwards and inwards at the sides, the rolling being deeper at the apices, so that in many they have a triangular shape. The rolled-up scales are abnormally thin. This thinness is readily demonstrated in one *Tajuria*, which has one or two spots of blue on the wings, where the scales are flat, normal in colour and of much greater density.

The two specimens of *Lycaenopsis puspa* from Formosa show much the same condition as the *Tajuria*. The two *L. planta* from Borneo are quite unusually leaden coloured. Under an inch objective the "colour scales" are almost invisible, but under a 12 mm. objective are seen to be excessively thin and rolled up absolutely tight, so tight as to look like a number of short thick pale hairs scattered over the surface of the wings. The fringes are also abnormal, the usual long, elegant, somewhat fan-shaped scales being replaced by scales like long thin hairs with the apex slightly split up.

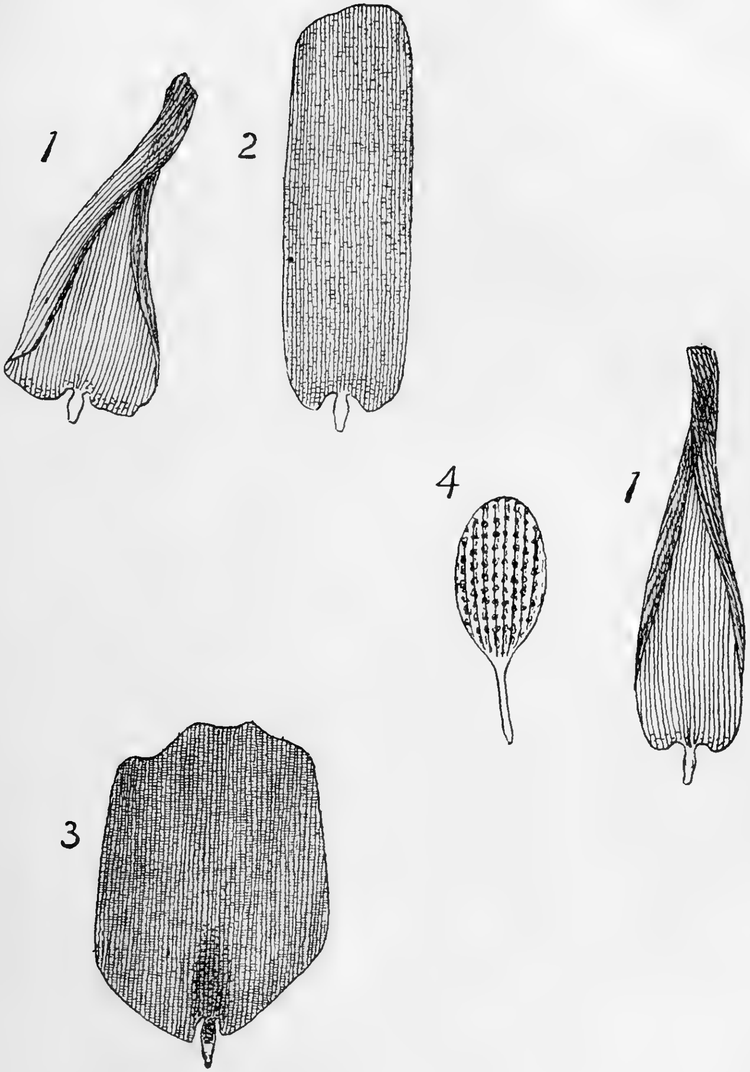
Breeding experiments with leaden *thetis* would be very interesting. These leaden aberrations, so widespread through the blue Lycaenids, may well be Mendelian recessives to the normal blue males. The "*dolus*" and "*menalcas*" group may be examples of Mendelian recessives superseding the normal dominants through whole species, as the recessive form of *Callimorpha dominula* with yellow hind-wings has entirely replaced the dominant with red hind-wings in certain parts of Italy. This suggestion is one put forward in order that some one may take the necessary steps to prove or disprove it.

A further point of interest in connection with the leaden *thetis* is that Mr. L. W. Newman thinks that they are unusually fragile. It is quite possible that the whole wing membrane is thinner than that of normal males, and, if so, it may be correlated with the thinness of the "colour scales." I have not been able to satisfy myself on the point, as I did not wish to destroy a specimen for this purpose.

Explanation of Plate XI.

1. "Colour" scales of leaden male *Agriades thetis.*
2. Blue "colour" scale of normal male *Agriades thetis.*
3. Smoky (light absorbing) scale of leaden male *Agriades thetis.*
4. Androconial scale of leaden male *Agriades thetis.*

The fine regular striae of the blue scale are only roughly indicated. The drawings are magnified equally.



E. A. Cockayne, del.

SCALES OF AGRIADES THETIS.

VIII. *On new and little-known* Lagriidae *from Tropical America.* By George Charles Champion, F.Z.S.

[Read March 7th, 1917.]

Plates XII, XIII.

The present paper gives an account of the unnamed species of *Statira* from S. America, the Antilles, etc., in the British Museum, supplemented by those in the Hope Museum at Oxford, and a few Brazilian and Trinidad forms kindly supplied by Mr. G. E. Bryant. The study of these S. American insects had to be undertaken under exceptionally difficult circumstances, as not a single definitely-named representative of any of the numerous species described by Mäklin was to be found in the collections in this country. It is therefore not improbable that some of them have been incorrectly identified by me from the descriptions alone, in which the sexual distinctions are not given, or, if seen, not recognised as such. The material examined is mainly that obtained by J. Gray, H. Clark, and A. Fry in the neighbourhood of Rio de Janeiro, and by H. W. Bates on the Amazons, the specimens from other S. American localities being few in number. Dr. R. F. Sahlberg was in Brazil in 1850 and earlier, and a few of his captures (most of which have been identified in the Fry collection) were described by Mäklin in 1875. H. W. Bates appears to have paid a good deal of attention to the genus *Statira* and its allies [1] while he was resident on the Amazons, doubtless on account of the great resemblance of many of them to genera of Carabidae, e.g. *Agra*, *Casnonia*, *Dromius*, etc.

Statira, Lep. et Serv.

Eighty-three members of this genus were recorded from Central America in the "Biologia" in 1889–1893, one only of which was known to me at that time to occur south of Panama. The collections from South America,

[1] These latter are described in the "Entomologist's Monthly Magazine," Vol. LIII, pp. 132–154, 188–195, 218–223, pl. 2, June–October, 1917.

etc., now under examination, include representatives of at least 130 more, showing that hundreds of species must exist on the southern continent. The following additions to the distribution, etc., of six of the Central American forms require notice : *S. denticulata*, Colombia (*Mus. Brit.*), an insect with denticulate anterior femora, one of two placed under Sect. A*a* in the table given in the "Biologia," the other, *S. glabrata*, having been found by Biolley as far south as Costa Rica; *S. costaricensis*, Colombia; *S. ingens*, Costa Rica (*Biolley*); *S. albolineata*, Belize, British Honduras (*Mus. Brit.*); *S. nigripennis*, Mäkl. [not Champ.], var. γ (Biol. Centr. Am., iv. 2, pl. 2, fig. 18), from Mexico, has been named *championi* by Pic (Mélanges exot.-entom. iv, p. 20, Sept. 1912). Amongst the South American *Statirae*, some (*S. catenata*, etc.) have very remarkable characters in the legs, antennae, or aedeagus,[2] or in the clothing of the under surface, in the males. Other structural peculiarities to be noted are : the presence of a long curved spine on the narrow basal portion of the anterior femora [3] in both sexes of certain species (*S. suturalis*, etc.); two rugose stigmata on the disc of the prothorax (*S. distigma*, ♂); a basal constriction of the anterior tibiae (*S. elegans*, *elegantula*, *casnonioides*); a deep, sharply-defined, triangular or oblong sulcus on the prothorax in front (*S. vageguttata*, etc.), etc. The apical joint of the antenna, too, is often greatly elongated in the male, as in *Lagria*. The species here enumerated may be grouped thus :—

A. Anterior femora armed with a long curved spine at base . . . . Nos. 1–5.

B. Anterior femora unarmed at base.

1. Species large, shining, castaneous, with darker, submetallic, catenulato-tuberculate elytra, and sharply dentate anterior tibiae . . . . No. 6.

[2] Dr. Sharp has been kind enough to examine this organ in two species (*S. viridipennis* and *S. geniculata*), and he tells me that when two projecting pieces are visible, one will be the conjoined lateral lobes (technically "tegmen"), the other the median lobe, this being really the inner one.

[3] A character evidently noticed by Hope or Westwood, the specimen of *S. costaricensis* in the Oxford Museum having an anterior leg detached and mounted separately to show this structure. It was overlooked by Mäklin in *S. suturalis*.

2. Species large, elongate, mostly resembling the Carabid-genus *Agra*, the elytra usually metallic,[4] nigro-tessellate in *S. meleagris*, and with two or more of the alternate interstices catenulato-tuberculate throughout their length or at least towards apex, the posterior femora bidentate at base in *S. gemmifer*; ♂ sometimes with strongly pronounced secondary sexual characters in the legs or aedeagus,[5] or in the clothing of the antennae or ventral surface.
   a. Elytra mucronate at tip . . . . . . Nos. 7–15.
   b. Elytra not mucronate at tip . . . . . Nos. 16–34.
3. Species large, very elongate, with a long, conical, red prothorax and metallic elytra, the latter acuminate at apex and with almost smooth interstices . . . . . . No. 35.
4. Species moderately large, narrow, black, with narrow head, elongate-cylindrical prothorax and cyaneous elytra, the interstices of latter almost smooth . . . No. 36.
5. Species moderately large, black, with brilliant green, non-tuberculate, mucronate elytra, and extremely slender antennae (as in *Othryades*) . . . . No. 37.
6. Species moderately large or small, resembling some of those placed under B 2*a*, with the elytra unarmed at the tip, blue or green, and bearing small, scattered, rounded tubercles Nos. 38–40.
7. Species resembling some of those placed under B 2*b*, with uneven, very feebly striato-punctate, brilliantly metallic elytra, which are catenulato-tuberculate towards sides or apex . . . . Nos. 41–43.
8. Species moderately large or small, the elytra usually metallic or with metallic lustre, with simple scattered setigerous impressions to tip (interruptedly catenulate laterally in *S. impressipennis*).

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[4] *S. agraeformis*, Champ., from Panama, belongs to this section.
[5] Penis-sheath (= conjoined lateral lobes of tegmen, sec. Sharp) twisted and asymmetric in males of *S. catenata, viridipennis, geniculata, asymmetrica* and *tortipes*.

a. Prothorax not or obsoletely canaliculate on disc . . . . Nos. 44–60.
b. Prothorax distinctly canaliculate on disc . Nos. 61–65.

9. Species elongate, with opaque black head and prothorax and purplish or dull black elytra, the latter bearing small rounded tubercles, the legs long . . . . Nos. 66, 67.

10. Species with a short, broad head and prothorax, metallic elytra, and stout antennae [6] . . . . No. 68.

11. Species castaneous in colour, with broadly viridi-vittate elytra and stout antennae . Nos. 69, 70.

12. Species testaceous or brown, with the elytra (except in vars.) infuscate or metallic along the sides, and the antennae slender.
a. Head and prothorax shining . . . . Nos. 71, 72.
b. Head and prothorax opaque, scabrous . No. 73.

13. Species testaceous, reddish, or brown, with the legs partly infuscate.
a. Prothorax densely, more coarsely punctate No. 74.
b. Prothorax finely scabroso-punctate or almost smooth . . . . Nos. 75, 76.

14. Species testaceous or reddish-brown, the legs included.
a. Prothorax feebly shining; eyes subapproximate . . . . No. 77.
b. Prothorax opaque, alutaceous; eyes distant . . . . No. 78.

15. Species testaceous, with blackish, flavo-vittate elytra, the upper surface dull . . No. 79.

16. Species castaneous or piceous, shining.
a. Elytra with each alternate interstice more or less tuberculate throughout . . . . No. 80.
b. Elytra with scattered setigerous impressions, sometimes nigro-lineate . . . . Nos. 81–86.

17. Species with red head and prothorax and blue or green elytra.
a. Anterior tibiae compressed at base; abdomen black . . . . No. 87.
b. Anterior tibiae simple; prothorax (♂) with two scabrous patches on disc . . . No. 88.

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[6] The Mexican *S. crassicornis*, Champ. and the Colombian *S. validicornis*, Mäkl. belong to this section.

18. Species small, slender, with opaque black head and prothorax, blue elytra, and yellow tarsi . . . . No. 89.
19. Species slender, with large head and narrow prothorax, piceous or in part testaceous, resembling the Carabid-genera *Dromius* and *Casnonia*; elytra with setigerous impressions, preceded by a more or less distinct tubercle; anterior tibiae compressed at base in *S. casnonioides* . . Nos. 90–93.
20. Species testaceous or reddish, the elytra (except in vars.) with metallic or black markings or fasciae, these latter sometimes greatly extended or confluent, the alternate interstices, at most, with setigerous impressions, the prothorax not incised on the disc in front, sometimes bivittate.
    a. Elytra with numerous small tubercles . No. 94.
    b. Elytra not tuberculate . . . . . . Nos. 95–106.
21. Species testaceous, with nigro-tessellate elytra No. 107.
22. Species testaceous, with a deep incision on the disc of the prothorax in front, the elytra (except in vars.) with coalescent black markings or wholly black . . . Nos. 108–110.
23. Species rufo-testaceous, shining, with nigro-bivittate prothorax and nigro-fasciate, closely setose, elytra, each of the interstices of latter seriato-punctate . . . No. 111.
24. Species testaceous, hairy, with coarsely punctate prothorax and nigro-maculate elytra, each of the interstices of latter seriato-punctate . . . . Nos. 112, 113.
25. Species slender, testaceous, with head and prothorax opaque and elytral suture, at least, infuscate.
    a. Elytra tuberculate; head small . . . No. 114.
    b. Elytra not tuberculate; head large . . No. 115.
26. Species with prothorax distinctly margined laterally.[7]
    a. Body obscure testaceous, the elytra fusco-fasciate [Nicaragua] . . . . No. 116.
    b. Body nigro-piceous or black, the prothorax red, the elytra blue . . . . No. 117.

[7] Various Central- and N.-American forms belong to this section.

27. Species small, Anthiciform, with short head, small eyes, stout antennae, and faintly striato-punctate elytra, the elytra with irregularly distributed, setigerous impressions.
   a. Body shining black, the prothorax and a patch on elytra often reddish or testaceous . . . . No. 118.
   b. Body black, the prothorax testaceous, the elytra blue . . . . No. 119.
   c. Body and terminal joint of antennae testaceous, head and apex of elytra black . No. 120.
28. Species resembling those placed under sect. 27, but with longer, deeply punctate-striate elytra, testaceous, with apical half of elytra violaceous . . . . No. 121.
29. Species with head considerably developed behind the eyes, the latter small, the prothorax subcylindrical or cordate.
   a. Head and prothorax closely, coarsely punctate; antennae stouter; body reddish-brown, piceous, or black, head and prothorax sometimes testaceous.
      †Elytra more elongate, with numerous setigerous impressions on alternate interstices . . . . Nos. 122, 123.
      ††Elytra shorter, with very few setigerous impressions; prothorax subcylindrical or cordate: species small, Anthiciform Nos. 124, 125.
   b. Head and prothorax much smoother, obsoletely punctulate; antennae very slender; body obscure testaceous, elytra black . . . . No. 126.
30. Species small, narrow, aeneo-piceous, with very coarsely, rugosely punctured head and prothorax, small, depressed eyes, and each elytral interstice seriato-punctate [Mexico] No. 127.
31. Species elongate, Strongyliiform, hairy, aeneo-piceous, with very coarsely punctate head and prothorax and coarsely punctato-striate elytra, the prothorax subquadrate Nos. 128, 129.
32. Species narrow, elongate, shining, hairy, resembling *Colparthrum*, with very large eyes in ♂, a long, smooth prothorax,

metallic, coarsely punctato-striate elytra, with inconspicuous setigerous impressions, and clavate femora . . . . No. 130.

33. Species narrow, elongate, resembling *Haemonia*, with extremely large eyes, very long, subserrate antennae, an almost smooth prothorax, and nigro-lineate elytra No. 131.

Section A.

1. **Statira costaricensis.** (Plate XII, fig. 1, anterior leg, ♂.)

Statyra histrio, Dej. Cat., 3rd. edit., p. 236 (1837).
Statira costaricensis, Champ., Biol. Centr.-Am., Coleopt. iv. 2, p. 36 (1889).

♂. Anterior femora greatly thickened, abruptly narrowed and angulate near the base, the narrow basal portion armed with a long curved spine; anterior tibiae hollowed beneath, and twisted, before the apex; antennal joint 11 nearly three times as long as 10.

Var.? Elytra more coarsely punctate-striate, the punctures on the disc transverse, the interstices slightly convex, the black markings much more extended and subcoalescent, the strongly angulate post basal fascia continued down the second interstice to beyond the middle and nearly joining the median transverse mark, the narrow, oblique subapical fascia reaching the suture and continued along it for a short distance, in front and behind.

Hab. Costa Rica; Colombia (*Mus. Oxon.*; *Mus. Brit.*, *ex. coll. Laferte*).

Described by me in 1889 from a mutilated example (without anterior legs) from Costa Rica. A specimen from Colombia in the Oxford Museum agrees with this insect, except that the black post-basal mark on the elytra is wanting. The variety?, ex coll. Laferté, from that of Dejean, is labelled *Statyra histrio*, mihi; it superficially resembles *S. vageguttata*, Pic, and *S. conspicillata*, Mäkl., species wanting the anterior femoral spine. The anterior femora themselves are more abruptly narrowed before the base (appearing angulate) than in the allied *S. suturalis*, Mäkl.

2. **Statira flavosignata,** n. sp. (Plate XII, fig. 2, ♂.)

♂. Elongate, depressed, shining, pale reddish-brown, the legs and under surface testaceous; the elytra each with an oblong mark near the suture at about the middle, two others obliquely placed below this, and two more before the apex (these two coalescent and forming an oblique fascia), yellow, the base also indeterminately flavescent. Head almost smooth, shallowly foveate in the middle between the widely separated eyes; antennae moderately long, joints 7–10 slightly decreasing in length, 11 about three times as long as 10. Prothorax oblong-subcordate, slightly narrower than the head, as long as broad, almost smooth, the basal margin not much raised. Elytra long, twice as broad as the prothorax, gradually widening to the middle, somewhat acuminate at the apex; finely punctato-striate, the interstices flat, 3, 5, and 9 with scattered setigerous punctures, those on 3 extending forwards to near the base, the others placed on the apical half. Anterior femora much thickened, abruptly narrowed and angulate near the base, the narrow basal portion armed with a long curved spine; anterior tibiae hollowed and slightly twisted at the apex beneath.

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

Hab. Ecuador (*Buckley*).

One male. In this insect the yellow markings on the apical two-thirds of each elytron are arranged into two oblique fasciae and an isolated submedian spot, the elytra themselves are much elongated, and the anterior femora and tibiae are shaped as in *S. costaricensis*, ♂.

3. **Statira spinigera**, n. sp.

♂. Elongate, rather dull, piceo-castaneous, the antennae, the margins of the elytra, the tarsi, and the bases of the femora, obscurely rufescent. Head rather narrow, shining, almost smooth, the eyes separated by more than half the width of one of them; antennae comparatively short, moderately stout, joint 11 nearly as long as 7–10 united. Prothorax longer than broad, oblong, constricted at the base, as wide as the head, alutaceous, obsoletely punctulate, feebly canaliculate on the disc anteriorly, and with two oblique distinctly punctured impressions in the middle before the base, the basal margin not much raised. Elytra long, twice as broad as the prothorax, gradually widened to the middle and somewhat rapidly narrowed posteriorly; finely punctato-striate, the interstices alutaceous, somewhat convex, flatter on the disc anteriorly, 3 with six widely separated small setigerous punctures and 5 and 9 with two or three others towards the apex. Anterior femora greatly thickened, abruptly narrowed near the base, the narrow basal portion armed with a long curved spine.

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

Hab. Brazil, Santa Catharina (*Fry*).

One male. This species has the elytra shaped as in *S. flavosignata*; but the head and prothorax are narrower, the antennae are stouter, and the upper surface is duller and almost uniformly fusco-castaneous.

4. **Statira acanthomera,** n. sp.

Moderately elongate, shining, piceous or reddish-brown, the darker example with the antennae in great part, the knees and tarsi, and the suture of the elytra at the base, ferruginous. Head rather broad, almost smooth, shallowly foveate in the middle between the widely separated eyes; antennae long, rather slender, joint 11 about as long as 8–10 united. Prothorax subcordate, as broad as long, about as wide as the head, moderately constricted before the base; sparsely, obsoletely punctulate, the basal margin not much raised, the disc foveate in the middle behind in one example. Elytra moderately elongate, much broader than the prothorax, gradually widened to the middle and rapidly narrowed posteriorly, transversely depressed below the base; finely punctato-striate, the interstices flat, 3 with six and 5 with four widely separated conspicuous setigerous punctures, 9 also with two or three punctures towards the apex. Ventral segments 2 and 3 with a few fine piligerous punctures between the usual double series of setigerous impressions running down 1–5. Anterior femora greatly thickened, abruptly narrowed and angulate near the base, the narrow basal portion armed with a long curved spine; anterior tibiae hollowed at the apex beneath.

Length $8\frac{1}{10}$, breadth 3 mm. (♂.)

Hab. Colombia (*Mus. Brit.*: type); Ecuador (*Buckley*).

Two specimens, assumed to be males, the one from Ecuador smoother beneath and somewhat immature. Less elongate and more shining than *S. spinigera*, the head and prothorax broader, the antennae much longer, the setigerous punctures on the disc of the elytra larger, the anterior femora angulate before the base, as in *S. costaricensis* and *S. flavosignata*. The Colombian example was acquired by the Museum in 1871. *S. nigella* and *S. fusca*, Mäkl., from the same country, may be allied forms?

5. **Statira suturalis.** (Plate XII, fig. 3, anterior leg, ♂.)

Statira suturalis, Mäkl., Act. Soc. Fenn. vii, p. 157 (1862).

♂. Antennae moderately long, joints 3–10 subequal in length, 11 about three times as long as 10.

♀. Antennae shorter, joints 4–10 decreasing in length, 11 less elongate.

Var. Elytra with two or three dark lines on the disc extending downward from the base.

Hab. BRAZIL, Rio de Janeiro, Petropolis, Constancia, Tijuca.

A reddish-brown, shining, rather convex insect, usually with the suture or two or three lines on the disc infuscate, these markings sometimes wanting; the anterior femora greatly thickened from near the base, and with the narrow basal portion armed with a long, curved spine (not noticed by Mäklin); the anterior tibiae slightly hollowed before the apex beneath; the elytral interstices 3, 5, and 9 with a few widely separated setigerous punctures. The aedeagus of the male is long and slender, tapering towards the tip. *S. presuturalis*, Pic (No. 81, infra), from the same region, is a very similar form, but it wants the anterior femoral spine.

SECTION B

6. **Statira dentigera,** n. sp.

Elongate, broad, widened posteriorly, shining; rufo-castaneous, the palpi piceous, the elytra aeneo-piceous, the latter with scattered, long, erect, bristly hairs. Head rather small, not so broad as the prothorax, almost smooth, foveate in the middle between the eyes, the latter very large, somewhat distant; antennae long, slender, joint 11 equalling 8–10 united. Prothorax slightly longer than broad, rounded at the sides, strongly constricted before the prominent basal margin; sparsely, minutely punctate. Elytra long, broad, widening to the middle, and there twice as broad as the prothorax, arcuately narrowed posteriorly, and acuminate at the apex; closely, finely punctato-striate, the interstices broad, flat on the anterior half of the disc, 3, 5, 7, and 9 with a series of rather large setigerous impressions extending throughout their length, the impressions (except those towards the base) each preceded by a rather prominent tubercle, the tubercles gradually becoming longer, cariniform, and catenulate towards the sides and apex, the first (sutural) interstice also with five impressions near the tip. Legs [posterior pair wanting] rather stout; anterior femora strongly clavate, sulcate along their outer half beneath, and also finely ciliate; tibiae pilose within, the anterior pair armed with a sharp triangular tooth at one-third from the tip.

Length 15, breadth 5 mm. (♂?)

Hab. Ecuador, Paramba (*Rosenberg*).

One specimen. The ciliate anterior femora and toothed anterior tibiae (not necessarily ♂-characters) bring this species near certain Central American forms, *S. glabrata*, Mäkl. and *S. denticulata*, Champ., placed by me at the head of the genus in the arrangement adopted in the "Biologia." Compared with *S. tuberculata*, Mäkl., the antennae are longer and more slender, the inter-ocular fovea is smaller, the prothorax is larger and smoother, and the first elytral interstice is tuberculate (instead of unarmed) at the apex. The general shape is like that of *S. laticollis*, Mäkl.

7. **Statira gemmifer.** (Plate XII, fig. 4, posterior leg, ♂.)

Statira gemmifer, Mäkl., Act. Soc. Fenn. vii, p. 147 (1862).

Posterior femora in each sex with a truncate, exteriorly toothed, prominence at the base, and a small triangular tooth at about the basal fourth, beneath (fig. 4); antennal joint 11 in ♂ about equalling 7–10, in ♀ 8–10 united; anterior tarsi slightly widened in ♂, all the tarsi and tibiae a little more hairy in ♂ than in ♀; eyes distinctly more approximate in ♂ than in ♀.

Hab. Brazil (*Mus. Brit.*, *Mus. Oxon.*), Rio de Janeiro (*Fry*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857), Minas Geraes (*Mus. Brit.*), Ilha Santo Amaro near Santos (*G. E. Bryant*: 23. iv. '12).

This is perhaps the finest known species of the genus. It has very elongate, sharply acuminate, translucent, aeneous elytra, with the alternate interstices closely seriato-tuberculate and catenulate throughout; the prothorax closely punctulate; the legs very elongate, slender, the posterior femora feebly bidèntate near the base beneath in both sexes; the tarsi and tibiae hairy; the antennae rather slender and infuscate. *S. gemmifer* may be the *S. regina*, Lac., of Dejean's catalogue, and his *S. gemmata* a var. of *S. geniculata*, Mäkl.?. Twelve specimens seen, including three males. The penis-sheath, so far as visible without dissection, appears to be symmetric.

8. **Statira agroides.** (Plate XII, fig. 5, aedeagus, in profile, ♂.)

Statira agroides, Lep. et Serv., Encycl. Méth., Ins. X. p. 480 (1827); Mäkl., Act. Soc. Fenn. vii, p. 148 (1862).

Statyra agroides, Dej. Cat., 3rd edit. p. 236 (1837).
Statira armata, Mäkl., op. cit. x, p. 636. (1875)

♂. Aedeagus (fig. 5): basal piece elongate,[8] produced into a long cleft, spiniform process inferiorly, the stout penis-sheath still longer and with a sagittiform hook projecting from the tip (as seen in profile).

Var.? Castaneous, the elytra black, the aedeagus of ♂ without projecting sagittiform piece at the tip (? withdrawn).

Hab. Brazil (*ex Mus. Dejean*; *Mus. Brit.*; *Mus. Oxon.*), Rio de Janeiro, Santa Catharina (*Fry*), Constancia (*J. Gray* and *H. Clark*), Petropolis, Santa Rita and Boa Sorta (*Dr. Sahlberg*: types of *S. armata*), Espirito Santo (*Descourtils*).

This insect seems to be fairly common in Brazil, and is easily recognisable amongst its allies by the mucronate apices of the elytra, the catenulate, posteriorly tuberculate alternate interstices, 1, 3, 5, 7 and 9, and the simple antennae and legs in the two sexes. The terminal joint of the antennae about equals 8–10 united in ♀, and is slightly longer in ♂. The colour varies from ferruginous or rufo-castaneous to piceous; the two examples with black elytra, from Constancia and Espirito Santo, may belong to a different species. The elytra in *S. agroides* are said to have a "bluish-violet reflection which ought to be more distinct in the living insect," a character of no importance in this genus. The imperfectly described *S. interrupte-costata*, Pic,[9] from French Guiana, seems to be an allied form.

9. **Statira longiceps,** n. sp. (Plate XII, fig. 6.)

Very elongate, shining; fusco-testaceous, the head and antennae rufescent, the latter with joints 1–3 and 11 darker, the eyes, palpi, and labrum black or piceous, the prothorax (except at the base) also slightly infuscate; elytra with a few long, bristly hairs. Head oblong, narrow, almost smooth, longitudinally grooved between the eyes, the latter large, somewhat depressed, well separated; antennae long, rather slender, joint 11 as long as 8–10 united. Prothorax wider than the head, much longer than broad, gradually narrowed from the middle forward, and constricted before the base, the

[8] A large chitinous tube from which the penis-sheath is extruded: it is usually withdrawn into the body, and not visible without dissection.

[9] Mélanges exot.-entom. xi, p. 19 (Nov. 1914).

raised basal margin terminating in a stout tubercle on each side; the surface with a few, widely scattered, minute punctures. Elytra long, gradually widening to the middle, acuminate posteriorly, the apices mucronate; closely, finely punctato-striate, the striae sinuate on the disc, the interstices 1, 3, 5 slightly widened and each with a series of somewhat closely placed, subquadrate, setigerous impressions extending throughout their length, 7 with a series of similar impressions down the apical half, and 9 with four others towards the tip, the interspaces between them longitudinally raised on the disc and tuberculate on the apical declivity. Legs very long, simple.

Length 12, breadth $3\frac{1}{5}$ mm. (♀?)

Hab. Brazil, Rio de Janeiro (*Fry*).

One specimen. A close ally of *S. agroides*, L. and S. (= *armata*, Mäkl.), and with the elytra mucronate at the tip and very similarly sculptured, differing from that insect in its oblong, narrow head, with shallow longitudinal inter-ocular groove, the less prominent eyes, and the laterally tuberculate basal margin of the prothorax. The catenulate first (sutural) elytral interstice and mucronate apex separate *S. longiceps* from *S. catenata*, *meleagris*, and others.

10. **Statira verrucosa,** n. sp.

Very elongate, widened posteriorly, moderately shining; nigro-piceous, the elytra with a faint brassy lustre; the elytra with long, erect bristly hairs, the antennae, tibiae, and tarsi pilose. Head long, narrow, almost smooth, shallowly depressed in the middle between the eyes, the latter large, moderately distant; antennae long, slender, joint 11 in ♂ about equalling 7–10, in ♀ 8–10, united. Prothorax long, narrow, the sides obliquely converging from about the middle forward, and constricted before the raised basal margin; closely, finely punctate, depressed in the centre at the base and longitudinally excavate behind the anterior margin. Elytra very long, widening to beyond the middle and there about three times the breadth of the prothorax, mucronate at the tip; closely, rather finely, crenato-striate throughout, the striae sinuate and arranged in pairs, the alternate interstices each with a series of approximate oblong, flattened spiculae, which become more prominent and cariniform towards the sides and apex. Legs very long.

Length 13, breadth nearly 4 mm. (♂♀.)

Hab. Upper Amazons, Ega (*H. W. Bates*).

Two specimens, assumed to be sexes, one having a longer apical joint to the antennae than the other. Closely related to *S. agraeformis*, Champ., from Panama (figured in B.C.-Am., Coleopt. IV, 2, pl. 1, fig. 7), the head not so broad, the eleventh antennal joint in ♂ shorter, the elytra with narrower, smaller tubercles (and the striae, in consequence, less sinuous), the legs infuscate, etc. *S. agroides*, *S. gemmifer*, and *S. catenata* are somewhat similar forms, all of them superficially resembling the Carabid-genus *Agra*, which is numerous in species in the same regions.

11. **Statira mucronata**, n. sp.

Elongate, widened posteriorly, shining; varying in colour from nigro-piceous to castaneous, the antennae more or less infuscate and with at least the apical joint ferruginous, the elytra in the darker examples brassy or greenish-aeneous; the elytra with numerous bristly hairs. Head rather closely punctate, deeply, broadly foveate between the eyes, the latter very large, somewhat narrowly separated; antennae stout, moderately long in ♂, shorter in ♀, joint 11 in ♂ equalling 6–10, in ♀ 8–10, united. Prothorax longer than broad, slightly narrower than the head, feebly rounded at the sides, constricted before the prominent basal margin; closely, conspicuously punctate, the interspaces polished, the disc transversely depressed on each side anteriorly and also excavate in the centre at the base. Elytra long, widening to beyond the middle, more than twice the width of the prothorax, mucronate at the tip; finely, deeply punctato-striate, the striae strongly undulate towards the sides and apex, the interstices convex, 3, 5, 7, and 9 throughout their length, and 1 at the apex, with a scattered series of setigerous impressions, the spaces between them longitudinally tuberculate, the tubercles on 7 and 9, and those towards the apex on 1, 3, 5, shorter and more closely placed than those on the disc. Femora moderately thickened.

Length 10–12, breadth $3\frac{3}{4}$–$4\frac{1}{5}$ mm. (♂♀.)

Hab. Brazil, Ceara (*Gounelle*).

Three males and three females, two only with metallic elytra. Very like *S. nigrocaerulea*, but with the alternate elytral interstices 3, 5, 7 and 9 here and there tuberculate throughout their length, the tubercles on 7 and 9 shorter and more numerous, much as in *S. tuberculata*, Mäkl.; the prothorax longer and a little more finely punctate; the antennae slightly stouter.

12. **Statira nigrocaerulea,** n. sp.

♂. Elongate, broad, widened posteriorly, shining; nigro-piceous, the eleventh antennal joint, the tips of the tarsi, and the head in one specimen, ferruginous or reddish, the elytra blue or bluish-green; the elytra with a few bristly hairs. Head broad, finely punctate, deeply, longitudinally impressed between the eyes, the latter very large, somewhat narrowly separated; antennae rather long, stout, joint 11 equalling 7–10 united. Prothorax as wide as the head, about as broad as long, feebly rounded at the sides, moderately constricted before the laterally-projecting raised basal margin; closely, rather coarsely punctate, the interspaces polished, the disc depressed in the centre at the base and also on each side anteriorly. Elytra long, more than twice the breadth of the prothorax, widening to beyond the middle, transversely depressed below the base, the apices mucronate; closely, finely, deeply punctato-striate, the striae crenate and posteriorly undulate, the interstices convex throughout, 3, 5, and 7 with from three to five deep setigerous impressions towards the apex, 9 with a scattered series of similar impressions along their entire length, and 1 with three others near the tip, the spaces between them longitudinally tuberculate and subcatenate. Legs long, the femora moderately thickened.

Length 11–11¼, breadth 3½–4 mm.

Hab. Brazil, Jatahy, Province of Goyas (*Pujol, ex coll. Fry*).

Two specimens, one with the tip of the aedeagus exposed, agreeing very nearly with the description of the Brazilian *S. nigra*, Mäkl.; but as the author says nothing about the stout antennae, or the mucronate apices of the elytra, and states that the broad inter-ocular impression is almost obsolete and the eleventh antennal joint (♂) about equals 6–10 united, the Jatahy insect must be treated as distinct. The allied *S. caelata*, Er., from Peru, should have a smoother prothorax. *S. peruana*, infra, has more slender antennae; a non-foveate head, the apices of the elytra obtuse, etc.

13. **Statira batesi,** n. sp.

♂. Elongate, rather narrow, shining; piceous, the elytra with a brassy lustre, the apical joint of the antennae ferruginous; the elytra with numerous long bristly hairs. Head slightly broader than the prothorax, closely, finely punctate, with a deep oblong fovea between the eyes, the latter very large, somewhat narrowly separated; antennae rather slender, long, joint 11 equalling 6–10 united. Prothorax rather narrow, oblongo-cordate, constricted before the prominent hind angles, the basal margin raised, the disc depressed in the centre behind; sparsely, finely punctate. Elytra long, gradually widened to the middle and there twice as broad as the prothorax, transversely depressed below the base, acuminate posteriorly, mucronate at the tip; closely, finely, deeply punctato-striate, the striae undulate, the interstices more or less convex, 3, 5, 7 and 9 with a scattered series of setigerous impressions, each of which is preceded by a prominent tubercle, 1 also with three or four tubercles before the apex, 7 and 9 catenulate throughout. Legs slender [anterior pair wanting].

Length $10\frac{1}{2}$, breadth $3\frac{1}{3}$ mm.

Hab. Upper Amazons Ega (*H. W. Bates*).

One male. This species agrees with *S. tuberculata*, *S. mucronata*, and *S. nigrocaerulea* in having the head deeply foveate between the eyes and the apices of the elytra mucronate, differing from the first-named in the convex interstices, smaller foveae, prominent tubercles, and more strongly mucronate apex of the elytra, and from the two others in its narrower shape, less thickened antennae, and the more prominent small scattered tubercles on the disc of the elytra.

14. **Statira cuspidata,** n. sp.

Elongate, somewhat robust, narrow, widened posteriorly, shining; piceous, the antennae (joints 1–4 excepted) ferruginous, the elytra metallic golden-green, the colour changing to golden and cupreous laterally, and to green across the base; the elytra with a few long, bristly hairs. Head about as wide as the prothorax, closely, minutely punctate, slightly hollowed between the eyes, the latter large, somewhat distant; antennae slender, moderately long, joint 11 about equalling 7–10 united. Prothorax considerably longer than broad, subcylindrical, constricted before the raised, laterally-projecting basal margin; densely, minutely punctate, the disc longitudinally depressed in the centre behind. Elytra long, widening to the middle and there considerably more than twice the breadth of the prothorax, acuminate posteriorly, the apices mucronate; closely, finely, deeply punctato-striate, the interstices more or less convex, 3, 5, and 9 each with a series of small setigerous impressions extending from a little below the base to the apex (those on 3 closely placed on the apical half), 1 and 7 also with three or four impressions before the tip, the spaces between them becoming more or less raised longitudinally or tuberculate towards the sides and apex.

Length 10, breadth $3\frac{1}{3}$ mm. (♀?)

Hab. Lower Amazons, Para (*H. W. Bates, ex coll. Pascoe*).

One example. Not unlike the Peruvian *S. viginti-punctata* (No. 46), but with a subcylindrical, subsulcate, densely, minutely punctate prothorax, and more numerous, much smaller setigerous impressions on the elytra, those on the apical half of the third interstice somewhat closely placed, the elytral apices mucronate. The longer and narrower prothorax, smaller head, deeply striate elytra, with more numerous smaller setigerous impressions in the interstices 3 and 5, separate *S. cuspidata* from *S. semi-cuprea* (No. 47). The sides of the elytra are brilliant cupreous towards the apex in the present species.

15. **Statira tuberculata.**

Statira tuberculata, Mäkl., Act. Soc. Fenn. x, p. 637 (1875).

Elongate, shining; dilute rufo-castaneous, the head and prothorax often more or less infuscate, the palpi, and sometimes the antennae also, piceous, the upper surface with a faint brassy lustre (in Mäklin's var. *a* the elytra are aeneous or green); the elytra with scattered long, bristly hairs. Head about as wide as the prothorax, almost smooth, deeply foveate in the middle between the eyes, the latter large and narrowly separated in ♂, a little smaller and more distant in ♀; antennae rather slender, joint 11 in ♂ about equalling 5–10, in ♀ slightly longer than 8–10, united. Prothorax a little longer than broad, moderately rounded at the sides, constricted before the prominent basal margin; finely punctate, often with one or two oblique impressions on each side of the disc. Elytra long, twice as wide as the prothorax, very slightly widening to the middle, pointed at the apex; finely punctato-striate throughout, the striae undulate, the interstices 3, 5, 7, and 9 each with a scattered series of large, deep, subquadrate, setigerous impressions, separated towards the sides and apex by elongate tubercles, those on 7 and 9 shorter and more prominent, the eighth interstice narrow and cariniform. Anterior femora strongly clavate, feebly ciliate.

Length $8\frac{1}{2}$–$12\frac{1}{2}$, breadth $2\frac{1}{2}$–$3\frac{1}{2}$ mm. (♂♀.)

Hab. Brazil, Petropolis and Santa Rita (*Sahlberg*: types), Rio de Janeiro, Bahia (*Fry*), Espirito Santo (*Descourtils*), Alto da Serra in San Paulo (*Bryant*).

Eleven specimens (9 ♂, 2 ♀) before me are referable to this species, two of them belonging to the colour var. *a* of Mäklin. There is also some variation in the shape and puncturing of the prothorax, and in the number of tubercles and setigerous impressions on the elytra, the latter being always large and deep. The apices of the elytra are pointed or submucronate. The frontal fovea is also deep. The sexual characters were not mentioned by the author.

16. **Statira sanctaremae,** n. sp.

Very elongate, narrow, shining; piceous, the elytra greenish-aeneous, the antennae in their outer half and the legs rufo-testaceous or ferruginous, the knees slightly infuscate. Head rather small, sparsely, finely punctate, unimpressed between the eyes, the latter large, narrowly separated; antennae moderately long, rather slender, pilose, joint 11 equalling 8–10 united. Prothorax longer than broad, a little wider than the head, feebly rounded at the sides, and constricted before the raised, laterally-projecting basal margin; closely, finely, conspicuously punctate, the disc transversely impressed on each side before and behind the middle. Elytra very long, twice as wide as the prothorax, somewhat rounded at the sides, gradually widening to the middle, without mucro at the tip; closely, finely punctato-striate, the interstices feebly convex, 1, 3, 5, 7, and 9 each with a series of rather small, deep, setigerous impressions extending throughout their length (closely placed on 3 and 5, and scattered on 1, 7, and 9), the spaces between them longitudinally raised or tuberculate, the tubercles elongate on 7 and 9. Tibiae pilose within.

Length 11½, breadth 3½ mm. (♀?)

Hab. Amazons, Santarem (*H. W. Bates*).

One specimen, now wanting the elytral setae. Smaller and less elongate than *S. verrucosa*, the head narrow, the prothorax not excavate in front, the elytra narrower, with smaller elevations on the alternate interstices, the striae straighter, and the apices unarmed.

17. **Statira longicollis.** (Plate XII, fig. 7, posterior leg, ♂.)

♀. *Statira longicollis*, Mäkl., Act. Soc. Fenn. vii, p. 151 (1862).

♂. Lower surface of the anterior femora at the base, and that of the other femora to near the apex, and a broad space down the middle of the metasternum and abdomen, thickly clothed with long, fine, projecting or semi-erect, hairs; antennae closely pilose, joint 1 moderately thickened, 10 much shorter than 9 and angularly dilated at the inner apical angle, 11 (as in ♀) nearly equalling 8–10 united; anterior tibiae gradually dilated on the inner side into a broad, subangular, concave plate; intermediate tibiae hollowed within; posterior tibiae (fig. 7) excavate along their inner face, broadly arcuato-emarginate towards the middle (as seen from above), and widened thence to the apex, appearing strongly sinuate within.

Hab. Brazil (*Mus. Oxon.*), Rio de Janeiro (*Fry*).

Eight specimens seen, three of which are males. If correctly identified by me, *S. longicollis* is a close ally of *S. viridipennis*, Lep. et Serv. (and not of *S. geniculata*, as stated by Mäklin), from which it differs in the narrower head and prothorax in both sexes, and in the following ♂-characters:—antennae with joint 1 less thickened, and 10 shorter and dentate at the apex within; intermediate femora ciliate to near the apex and the ventral surface more hairy; posterior tibiae strongly sinuate within, the plate on the anterior pair less angular. The number and arrangement of the setigerous impressions on the elytral interstices 3, 5, and 9 are much the same in the two species. The colour is variable—piceous or rufo-castaneous, the elytra with an aeneous or greenish lustre, the two basal joints of the antennae sometimes infuscate.

18. **Statira meleagris.** (Plate XII, fig. 8, ♂.)

♂. *Statira meleagris*, Mäkl., Act. Soc. Fenn. vii, p. 149 (1862).

Antennal joint 11 in ♂ equalling 7–10, in ♀ 8–10, united; intermediate femora in ♂ gradually thickened outwards and then abruptly hollowed before the apex beneath.

Hab. Brazil, Rio de Janeiro (*Fry, Mus. Oxon.*), Espirito Santo (*Mus. Brit.*).

Eight examples seen. A very elongate, pallid form allied to *S. catenata*, Mäkl., with the widened, catenulate alternate elytral interstices 3, 5, 7, and 9 each bearing a series of somewhat closely placed, subquadrate, black impressions; the legs and antennae differently formed or clothed, and the abdomen almost glabrous (the usual setae only present), in the ♂; the head narrow and sulcate between the eyes.

19. **Statira catenata.** (Plate XII, figs. 9, ♂; 9*a*, *b*, penis-sheath, ♂.)

♀. *Statira catenata*, Mäkl., Act. Soc. Fenn. vii, p. 148 (1862).
♂. *Statira plumicornis*, Deyr. in litt.

♂. Antennae thickened, joint 1 very stout, 2 quite short, 8–10 rapidly decreasing in length, 9 and 10 dentate at the inner apical angle, 11 very elongate, equalling 7–10 united, 3–10 wth a dense fringe of long hairs within; anterior femora strongly incrassate, ciliate at the base beneath; anterior tibiae broadly, angularly explanate towards the apex within; intermediate femora ciliate beneath; intermediate tibiae hollowed along their inner face; posterior femora very stout, curved, excavate and densely ciliate beneath, angularly dilated before the apex; posterior tibiae sinuously bowed, broadly widened in their outer half, excavate and pubescent within, and furnished with a dense brush of very long hairs at about the middle of their upper inner edge; metasternum and abdomen thickly clothed with long hairs down the middle; penis-sheath [10] stout, asymmetric, broadly, obliquely, subangularly dilated at the apex, serrulate along the upper edge.

♀. Antennae, slender, simple, joint 11 nearly or quite equalling 8–10 united.

Hab. Brazil, Rio de Janeiro, Santa Catharina (*Fry*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857), State of San Paulo (*Gounelle*), Minas Geraes (*Mus. Brit.*).

Nine specimens seen, including three males. The extraordinary combination of characters in the structure or clothing of the legs, antennae and ventral surface in this sex makes *S. catenata* easily recognisable, at least in the ♂; the ♀, however, is very like that of *S. geniculata*, Mäkl., differing from it in having the alternate elytral interstices a little broader, 5 and 7 with more numerous setigerous impressions. The amount of catenulation of these interstices is somewhat variable in both insects.

20. **Statira viridipennis.** (Plate XII, figs. 10, 10*a*, aedeagus, ♂.)

Statira viridipennis, Lep. et Serv., Encycl. Méth., Ins. x, p. 480 (1827); Mäkl., Act. Soc. Fenn. vii, p. 149 (1862).

[10] The conjoined lateral lobes of the tegmen, sec. Sharp.

♂. Antennae a little thicker than in ♀, joint 1 very stout, 10 dentate at the apex within, 11 nearly equalling 7–10 united, 3–10 thickly pilose on their inner side; anterior femora very stout; anterior tibiae angularly explanate towards the apex within; intermediate tibiae hollowed along their inner face; posterior femora closely ciliate along their basal half beneath; posterior tibiae excavate within, widened outwards, and broadly, shallowly emarginate at about the middle, appearing sinuate on their inner edge; metasternum and abdomen thickly pilose down the centre, the fifth segment broadly depressed in the middle posteriorly.

Aedeagus (figs. 10, 10*a*): basal piece stout, curved, boat-shaped; penis-sheath asymmetric, twisted, obliquely dilated outwards into an elongate, spoon-shaped piece, which is angulate on the right side at some distance before the tip.

Hab. BRAZIL (*Mus. Brit.*, *Mus. Oxon.*), Rio de Janeiro (*Fry*), Constancia and Tijuca (*J. Gray* and *H. Clark*, Jan. 1857).

The long series of this species before me vary in colour from piceous to rufo-testaceous; the prothorax and antennae (joints 1 and 2 excepted) are usually red; the elytra with a translucent green, aeneous or cupreous lustre; the legs in most of the specimens testaceous or rufo-testaceous, the knees and tarsi sometimes infuscate. The absence of the setigerous impressions along the seventh elytral interstice separates both sexes of *S. viridipennis* from the very closely allied *S. geniculata*, Mäkl.

21. **Statira geniculata.** (Plate XII, figs. 11, 11*a*, aedeagus, ♂.)

?*Statyra gemmata*, Dej. Cat., 3rd edit., p. 236 (1837).
Statira geniculata, Mäkl., Act. Soc. Fenn. vii, p. 150 (1862).

♂. Antennae very long and slender, joint 1 scarcely stouter than in ♀, 10 angulate at the inner apical angle, 11 nearly equalling 8–10 united; eyes extremely large, subcontiguous; anterior femora very stout, almost glabrous; posterior femora ciliate beneath; intermediate and posterior tibiae closely pilose within, the latter simple; metasternum and abdomen thickly clothed down the middle with long, erect, fulvous hairs, the fifth segment broadly depressed in the centre posteriorly. Aedeagus (figs. 11, 11*a*): basal piece long, curved; penis-sheath elongate, broad, twisted, deeply grooved, the apical portion fiddle-shaped.

Hab. Brazil (*ex Mus. Dejean*; *Mus. Oxon.*), Rio de Janeiro, Bahia (*Fry*), Espirito Santo (*Mus. Brit.*; *Descourtils*).

Numerous specimens seen, these varying greatly in the colour of the body and legs, and in the intensity of the metallic suffusion of the elytra; the antennae are usually rufo-testaceous with the basal two or three joints infuscate, rarely black in their basal half. This species, if correctly identified by me, is closely related to *S. viridipennis*, differing from it in the more or less catenulate elytral interstices 1, 3, 5, 7, and 9 (the catenulation on 7 extending along their entire length), and in the simple anterior and posterior tibiae, and the slender basal joint of the antennae of the male. The fiddle-shaped outer portion of the penis-sheath (= tegmen), too, is characteristic of the present insect.

22. **Statira asymmetrica,** n. sp. (Plate XII, fig. 12, penis-sheath, ♂.)

♂. Very elongate, narrow, shining; piceous, the elytra with a translucent aeneous lustre, the head, antennae (the slightly infuscate basal joint excepted), legs, and under surface testaceous or rufo-testaceous, the elytra with a few long bristly hairs. Head rather small, short, almost smooth, the eyes large, narrowly separated; antennae very slender, extremely elongate, joint 11 about equalling 8–10 united. Prothorax wider than the head, subcordate, scarcely longer than broad, the basal margin prominent; alutaceous, sparsely, minutely punctate. Elytra very long, subparallel, less than twice the width of the prothorax, rounded at the tip; closely, finely punctato-striate, the interstices flat on the disc, 3 widened and with a series of about twelve, and 5 and 7 with from 8–10, deep, subquadrate, setigerous impressions, 9 also with several others down the apical half, the spaces between the impressions longitudinally raised and catenato-tuberculate from about the middle to the apex. Metasternum and ventral segments 1–5 hollowed and thickly pilose down the middle. Penis-sheath long, broad, asymmetric, twisted, arcuately dilated on the right side at some distance before the apex, the apical portion spoon-shaped. Legs very long; anterior femora thickened; posterior femora closely ciliate in their basal half beneath; posterior tibiae sinuously compressed, appearing hollowed from a little below the base to near the apex, closely pilose within.

Length 10, breadth $2\frac{3}{4}$ mm.

Hab. Brazil, Rio de Janeiro (*Fry*).

One male. A close ally of *S. geniculata*, Mäkl., differing from the corresponding sex of that species in having a much smaller, shorter head, a less elongate prothorax, more slender antennae, sinuously compressed, hairy posterior tibiae, and the broad penis-sheath dissimilarly formed. The non-dilated posterior tibiae, etc., separate *S. asymmetrica* from *S. tortipes*, *S. arcuatipes*, and other forms with bowed or twisted tibiae in the male.

23. **Statira tortipes,** n. sp. (Plate XII, figs. 13, posterior leg; 13*a*, penis-sheath, ♂.)

Very elongate, narrow, moderately shining; obscure testaceous, the eyes black, the elytra in some specimens with a faint aeneous lustre, the latter with a few very long, bristly hairs. Head small, almost smooth, obsoletely sulcate between the eyes, the latter large and moderately distant; antennae long, slender, joint 11 in ♂ equalling 8–10 united, very little shorter in ♀. Prothorax wider than the head, oblongo-cordate; very sparsely, obsoletely punctate, slightly depressed in the middle at the base. Elytra elongate, subparallel; closely, finely punctato-striate, the interstices almost flat, 3 with a series of about eight to ten, and 5 with five or six, setigerous impressions, 9 also with three impressions near the tip, 3 and 5 catenulate posteriorly.

♂. Femora ciliate beneath, the anterior pair very stout, the intermediate pair clavate, and the posterior pair angularly dilated towards the apex; posterior tibiae abruptly, bisinuately twisted, broadly dilated, concave and thickly clothed with fine hairs within, appearing closely ciliate along their inner upper edge (fig. 13); metasternum pilose down the middle, the ventral segments 1–3 and 5 (except on the basal half) also with numerous long erect hairs down the centre; penis-sheath (fig. 13*a*) twisted, asymmetric, angulate on the left side, the apical portion somewhat shovel-shaped.

♀. Metasternum pilose down the middle; anterior and intermediate femora ciliate at the base.

Length 10–11, breadth 3–3¼ mm. (♂♀.)

Hab. Brazil, Ceara (*Gounelle*: ♂♀), Rio de Janeiro (*Fry*: ♀), Alto da Sierra in San Paulo (*G. E. Bryant*, 16. iii. '12: ♀).

One male (somewhat injured by an *Anthrenus*) and three females from Ceara, and a female from each of the other localities. An immature-looking insect related to *S. longicollis*, Mäkl., with a shorter head and prothorax, smaller eyes, etc.; the posterior femora angularly dilated (as in *S. catenata*), and the posterior tibiae abruptly, bisinuately twisted, pilose, and dilated, in the ♂, the tibiae more strongly sinuate and more hairy than in the same sex of *S. arcuatipes* and *S. fuscitarsis*, these latter moreover wanting the pilosity down the middle of the abdomen. The penis-sheath is asymmetric, and shaped somewhat as in *S. viridipennis* and its allies.

24. **Statira arcuatipes.** (Plate XII, figs. 14, ♂; 14*a*, aedeagus, ♂.)

♂. *Statira arcuatipes*, Pic, Mélanges exot.-entom. iv, p. 14 (Sept. 1912).

Very elongate, rather narrow, the head and prothorax dull, the rest of the upper surface moderately shining; piceous or nigro-piceous, the elytra bluish-green or green, sometimes with cupreous reflections, the antennae often in part ferruginous; the elytra with a few, long, bristly hairs. Head almost smooth, feebly grooved between the eyes, the latter very large and somewhat narrowly separated; antennae long, slender, shorter in ♀, joint 11 in ♂ equalling 6–10, in ♀ about 8–10, united. Prothorax oblongo-cordate, rather sparsely, minutely punctulate. Elytra long, subparallel in their basal half in ♂; closely, finely punctato-striate, the interstices almost flat on the disc, 3 and 5 tuberculato-catenate towards the apex, 3, 5, and 7 (those on 7 present in one ♂-specimen only) with several widely scattered setigerous impressions, and 9 with three impressions near the tip.

♂. Intermediate femora gradually widened to near the apex, and abruptly hollowed thence to the tip, the angle thus formed clothed with short hairs externally; posterior femora towards the apex very broadly, arcuately dilated, and deeply sulcate beneath, glabrous; posterior tibiae sinuously twisted, broadly dilated, hollowed and pubescent within; penis-sheath symmetric, long, compressed, the tip triangularly dilated as seen from above, hooked beneath, the tube in which it is enclosed produced into a long spiniform process on each side.

Var. Femora and tibiae, except at their apices, testaceous. (♂♀.)

Length 10–11$\frac{1}{2}$, breadth 2$\frac{4}{5}$–3$\frac{1}{10}$ mm. (♂♀.)

Hab. Brazil, State of San Paulo [type], Petropolis (*J. Gray* and *H. Clark*, Feb. 1857), Rio de Janeiro (*Fry*).

Seven males in the Fry collection, including two of the variety with pallid femora and tibiae, are undoubtedly referable to *S. arcuatipes*, Pic; and three females with similarly coloured legs, two of them from Petropolis, must also belong here. These insects were labelled by Fry as the sexes of the same species. The variety nearly agrees with the description of *S. fuscitarsis*, Mäkl., cf. infra.

25. **Statira fuscitarsis.** (Plate XII, fig. 15, posterior leg, ♂.)

♀. *Statira fuscitarsis*, Mäkl., Act. Soc. Fenn. x, p. 638 (1875).

Very like *S. arcuatipes*, Pic, the head and prothorax nigro-piceous, the elytra brilliant metallic green or brassy-green, the femora (except at the apex in one example, ♀) and tibiae clear rufo-testaceous (♂) or testaceous (♀); the apical antennal joint of ♂ still more elongate, equalling 5–10 united; the eyes as large as in that species; the elytral interstices 3 and 5 with from three to five widely separated setigerous impressions down the disc and both tuberculato-catenate on the apical declivity; the intermediate and posterior femora, and the posterior tibiae, shaped exactly as in the ♂ of *S. arcuatipes*, except that the posterior tibiae (fig. 15) bear a dense brush of hairs at about the middle of the concave inner face; the penis-sheath (so far as visible) shaped as in *S. arcuatipes.*

Hab. Brazil, Rio de Janeiro (*Fry*, ♂♀), Petropolis (*Dr. Sahlberg*: type).

A pair from the Fry collection are provisionally referred to this species, the type of which was captured at Petropolis. The male of *S. catenata* has a somewhat similar brush of much longer hairs on the posterior tibiae. *S. fuscitarsis* is said to have four additional setigerous impressions on the seventh elytral interstice, and those on the disc large, but too much importance need not be placed on these characters. Mäklin ignored, or overlooked, the marked sexual peculiarities of many of these insects, and it is therefore impossible to certainly identify some of his *Statirae* from the descriptions alone.

26. **Statira tibialis.**

♂. *Statira tibialis*, Pic, Mélanges exot.–entom. iv, p. 14 (Sept. 1912).

♂. Antennae rufo-testaceous, with joint 11 equalling 6–10 united; intermediate femora gradually widened to near the apex, and hollowed thence to the tip, concave along their lower face, glabrous; posterior femora sulcate beneath, gradually, arcuately dilated on their lower edge to near the apex; posterior tibiae simply sinuate, broadly dilated, hollowed and sparsely pubescent within; elytra metallic green, the interstices 3 and 5 with four or five widely separated setigerous impressions, becoming tuberculato-catenate towards the apex; penis-sheath simply acuminate at the tip.

Hab. Brazil, Salobro [type], Ilha Santo Amaro near Santos (*G. E. Bryant*: 4. iv. '12).

A male found by Mr. Bryant is perhaps referable to this species, a very close ally of *S. arcuatipes*, according to its describer. The shape of the penis-sheath (examined in four out of the seven males seen of the last-named insect) shows that *S. tibialis* cannot be a form of *S. arcuatipes*.

27. **Statira simplicipes**, n. sp.

Very like *S. arcuatipes*, Pic, the elytra relatively narrower, subparallel in ♂, green or brassy, the prothorax also with an aeneous lustre, the antennae (the basal joints excepted) testaceous; antennal joint 11 in ♂ nearly equalling 7–10, in ♀ 8–10, united; eyes slightly smaller; prothorax a little less rounded at the sides, subcylindrical anteriorly in some specimens, distinctly punctate; elytral interstices 3 and 5 with more numerous setigerous impressions (3 with from ten to twelve and 5 with about six), catenato-tuberculate at the apex; legs long and slender, those of the ♂ simple, as in ♀; penis-sheath of ♂ acuminate at tip.

Var. The femora and tibiae, the knees excepted, testaceous.

Length 9–10½, breadth 2½–3 mm. (♂♀.)

Hab. Brazil (*Mus. Brit.*, *Mus. Oxon.*), Petropolis and Constancia (*J. Gray* and *H. Clark*, Feb. 1857: var.), Rio de Janeiro (*Fry*: type).

Eight specimens, three only belonging to the dark-legged form, one of each of them acquired by the British Museum in 1871. Extremely like *S. arcuatipes*, and with the legs varying in colour in the same way; the legs simple in the two sexes, the apical joint of the antennae much shorter in the ♂, and the aedeagus not dilated at the tip. Compared with *S. amoena*, Mäkl., which also has simple intermediate and posterior legs in the ♂, the more numerous setigerous impressions on the third and fifth elytral interstices, and the less elongate apical joint of the ♂-antenna, will serve to distinguish the present species. These three forms occur, with many others, in the vicinity of Rio de Janeiro.

28. **Statira amoena.**

♀. *Statira amoena*, Mäkl., Act. Soc. Fenn. vii, p. 152 (1862).

Very elongate, narrow, shining; piceous or nigro-piceous, paler beneath, the apical antennal joint usually ferruginous, the elytra translucent green, aeneous, or aeneo-cupreous, the latter with scattered, long, bristly hairs. Head rather small, almost smooth, the eyes very large and subapproximate in ♂, more distant in ♀; antennae long, slender, joint 10 subtriangular and 11 about equalling 6–10 united in ♂, 11 as long as 8–10 in ♀. Prothorax oblongo-cordate, closely, minutely punctulate, the basal margin very prominent. Elytra long, subparallel in their basal half, finely punctato-striate, the interstices flat, 3 with about eight or nine and 5 with six or seven setigerous impressions scattered between the base and apex, and 9 with two or three similar impressions near the tip, the spaces between them longitudinally raised or tuberculate on the apical declivity. ♂. Anterior femora thickened, glabrous; intermediate and posterior femora gradually widened to near the apex, and hollowed thence to the tip; posterior tibiae closely pilose along their outer half within.

Length 10–12, breadth $2\frac{1}{3}$–3 mm. (♂♀.)

Hab. Brazil, Rio de Janeiro (*Fry*).

The above description is taken from four males and two females captured by Fry. It is one of several extremely closely allied Brazilian forms, the females of which are scarcely distinguishable *inter se*, though the males possess marked specific characters in the structure of the legs, etc. Mäklin's description of *S. amoena* must have been taken from a ♀, and it would apply almost equally well to the same sex of *S. arcuatipes*, Pic.

29. **Statira micans.**

Statyra morbillosa, Dej. Cat., 3rd edit., p. 236 (1837).
♂. *Statira micans*, Mäkl., Act. Soc. Fenn. vii, p. 153 (1862).

Extremely like *S. amoena*, Mäkl. (as here identified), but with several setigerous impressions on the seventh elytral interstice (altogether wanting in *S. amoena*), 3, 5, 7, and 9 tuberculato-catenate towards the apex; the head longitudinally grooved or impressed between the eyes, the latter not so large in ♂; the eleventh antennal joint of ♂ nearly equalling 6–10 united; the legs variable in colour, simple in ♂; the aedeagus narrow, acuminate, the sheath straight, truncate at tip.

Hab. Brazil (*ex coll. Dejean*), Rio de Janeiro (*Fry*), Bahia (*Reed*), Corcovado (*G. E. Bryant*).

Seven examples seen, the one from the Dejean collection being labelled with the MS. name *S. morbillosa.* Compared with the variable *S. geniculata*, it is a little smaller and less elongate, the setigerous impressions and tubercles on the elytral interstices 3, 5, 7 and 9 are reduced in number (especially on 7); and in the ♂ the abdomen is glabrous down the middle, the legs are simple, and the penis-sheath of a totally different shape. Mäklin does not mention the longitudinal inter-ocular groove (also present in his *S. rufifrons*), and the identification of the insect before me with his species is not certain.

30. **Statira formosa,** n. sp.

♂. Very elongate, rather narrow, shining; piceous, the elytra brilliant golden-green, cupreous along the apical margin and on the humeral callus; the elytra with numerous, and the head and abdomen with a few, long, fine, erect bristly hairs. Head rather narrow, not wider than the prothorax, with a few minute scattered punctures, the eyes very large, somewhat narrowly separated; antennae long, slender, joint 11 very elongate, equalling 6–10 united. Prothorax narrow, considerably longer than broad, the sides obliquely converging from the middle forward and sinuately compressed before the base, the basal margin raised; sparsely, minutely punctate, the disc with a posteriorly widened, interrupted, rather broad median channel, and an oblique curved depression on each side of the disc, the transverse basal sulcus not extending across the middle. Elytra very elongate, subparallel, rather more than twice the width of the prothorax, flattened on the disc, and with an oblong, deep, intra-humeral depression; closely, finely, sinuately striato-punctate, the interstices flat, 1, 3, 5, and 7 with numerous small setigerous impressions scattered throughout their length, 9 also with several rather large impressions along the apical half, those towards the apex on 7 and 9 each preceded by a tubercle or short carina. Legs very long, slender.

Length $12\frac{1}{3}$, breadth $3\frac{2}{3}$ mm.

Hab. Ecuador (*Buckley*).

One male. An Agraeform insect allied to the Colombian *S. steinheili*, Mäkl., with brilliant golden-green elytra, the alternate interstices of which have numerous small setigerous impressions scattered throughout their length, the seventh and ninth catenulate towards the tip.

31. **Statira laticollis.**

♀. *Statira laticollis*, Mäkl., Act. Soc. Fenn. x, p. 637 (1875).

Elongate, rather broad, widened posteriorly, moderately shining; rufo-testaceous, castaneous, or piceous, the elytra with a more or less distinct aeneous lustre, the setigerous impressions towards the apex indicated by darker subquadrate spots in the light-coloured or immature individuals, the elytra with a few erect bristly hairs towards the apex. Head closely, finely punctate, the eyes large, somewhat distant; antennae long, slender, joint 11 in ♂ as long as the four or five preceding joints united, in ♀ about equalling 8–10. Prothorax as wide as the head, not or very little longer than broad, moderately rounded at the sides, constricted before the base, the basal margin very prominent; densely, finely punctate. Elytra long, widening to beyond the middle in both sexes, and there more than twice as broad as the prothorax, the sides arcuately converging thence to the apex; closely, finely punctato-striate, the interstices broad, almost flat on the disc, 3 and 9 with four or five, and 5 and 7 with two or three, deep setigerous impressions on the apical half or third, the spaces between them more or less raised longitudinally or tuberculate. Anterior femora moderately clavate, bare.

Length $10\frac{1}{2}$–12, breadth $3\frac{1}{2}$–$4\frac{1}{10}$ mm. (♂♀.)

Hab. Brazil, Santa Rita (*Dr. Sahlberg*, Aug. 1850 : type), Petropolis, Constancia (*J. Gray* and *H. Clark*, Jan. and Feb. 1857), Rio de Janeiro, Espirito Santo (*Fry*).

This insect is apparently not uncommon in the neighbourhood of Rio de Janeiro, to judge from the numerous specimens before me. It is extremely probable that *S. laticollis* is a dark ♀ of the previously described *S. rufa*, Mäkl., and that the latter is an immature ♂ of the same species; but as the author makes no comparison between them, the identification is uncertain. The apically tuberculate, subcatenulate alternate elytral interstices 3, 5, 7, and 9, and the finely impressed striae, are characteristic of the present species. In pallid examples the setigerous impressions are indicated by dark spots, much as in typical *S. nigrosparsa*, Mäkl. A specimen (♀) before me from Rio de Janeiro, rufous in colour, with testaceous elytra, and a fovea on each side of the disc of the prothorax behind the middle (not mentioned by Mäklin), may be referable to *S. rufa*, the type of which must be a ♂, with a very long eleventh antennal joint.

32. **Statira viriditincta**, n. sp.

Elongate, widened posteriorly, moderately shining; piceous or nigro-piceous, the femora paler at the base, the elytra with a brassy or greenish lustre, the antennae (except two or more of the basal joints) ferruginous, the elytra with a few bristly hairs towards the apex. Head densely, minutely punctate, smoother in front, slightly hollowed between the eyes, the latter very large, somewhat distant; antennae long, slender, joint 11 as long as five or six of the preceding joints united. Prothorax as wide as, or a little wider than, the head, as broad as long, moderately rounded at the sides, strongly constricted before the raised basal margin; densely, very finely punctate. Elytra long, widening to beyond the middle, arcuately narrowed posteriorly; closely, finely punctato-striate, the striae deeply impressed towards the tip, the interstices more or less convex, 3 with five or six scattered setigerous impressions down the apical half, and 5, 7, and 9 with from two to four (those on 7 sometimes wanting) similar impressions towards the apex, the impressions each preceded by a small tubercle.

Length 9–11, breadth 3–4 mm. (♂.)

Hab. AMAZONS, Santarem, Ega (*H. W. Bates*).

Six examples, possibly all males. This is an Amazonian form of *S. laticollis*, Mäkl., that requires a distinctive name. The more deeply impressed striae (especially at the apex) and the convex interstices of the elytra, the relatively longer apical joint of the antennae, the blackened basal joints of the latter, and the darker body, are sufficient to distinguish *S. viriditincta*. A still more nearly allied form, *S. peruana*, occurs at Chanchamayo, Peru.

33. **Statira peruana**, n. sp.

Elongate, widened posteriorly, moderately shining; nigro-piceous, the apical joint of the antennae obscure ferruginous, the elytra with a green or bluish-green lustre; the elytra with a few long bristly hairs towards the apex. Head closely, minutely punctate, the eyes very large, somewhat distant; antennae slender, moderately long, joint 11 about equalling the four preceding joints united. Prothorax a little wider than the head, scarcely so long as broad, rounded at the sides, strongly constricted before the raised basal margin; closely, minutely punctate. Elytra long, widening to beyond the middle, and there considerably more than twice the breadth of the prothorax, arcuately narrowed posteriorly; finely, closely, deeply punctato-striate, the interstices convex, 3 with five, and 5, 7, and

9 each with three or four, scattered deep setigerous impressions towards the apex, the spaces between them longitudinally swollen and subcatenulate.

Length $11\frac{3}{4}$–12, breadth 4 mm. (♀?)

Hab. Peru, Chanchamayo (*ex coll. F. Bates*).

Two examples, sex not ascertained. This is yet another form of *S. laticollis*, approaching *S. caelata*, Er., and *S. nigra*, Mäkl., these latter having the ninth elytral interstice interruptedly catenulate for nearly its entire length. The crenate elytral striae in *S. peruana* are still more deeply impressed at the apex than in the Amazonian *S. viriditincta*, and the elevations between the setigerous impressions are strongly convex longitudinally, instead of shortly tuberculate as in the last-named insect.

34. Statira rufifrons.

♀. *Statira rufifrons*, Mäkl., Act. Soc. Fenn. vii, p. 152 (1862).

Elongate, rather narrow, shining; obscure testaceous above, darker beneath, the prothorax aeneous, the rest of the upper surface (the front of the head excepted) with a faint aeneous lustre; the elytra with a few long, scattered, bristly hairs. Head broad, sparsely, minutely punctate, longitudinally sulcate and foveate in the middle between the eyes, the latter large, moderately distant; antennae long, slender, joint 11 in ♂ about equalling 7–10, in ♀ 8–10, united. Prothorax as wide as, or a little wider than, the head, longer than broad, oblongo-cordate, constricted before the prominent basal margin; closely, finely, conspicuously punctate, the interspaces polished, the disc sometimes with a faint trace of a median channel. Elytra long, twice as broad as the prothorax, gradually widened to the middle, somewhat acuminate posteriorly; closely, finely punctato-striate, the striae deeply impressed at the apex, the interstices flat on the disc, 3 and 5 each with five or six deep setigerous impressions scattered between the base and apex, and 9 with three or four (and 7 sometimes with one) similar impressions near the tip, the interspaces between them raised and subcatenulate towards the apex. Anterior femora moderately clavate, bare.

Length $8\frac{1}{10}$–10, breadth $2\frac{1}{2}$–$3\frac{1}{5}$ mm.

Hab. Brazil (*Mus. Oxon.*), Rio de Janeiro (*Fry*).

Six examples agreeing very nearly with Mäklin's description. Smaller and narrower than *S. laticollis*, Mäkl., as here identified; the head and prothorax more polished, the former longitudinally sulcate and foveate between the eyes, the prothorax oblong, less densely punctate, and aeneous in colour; the elytra less dilated, translucent aeneo-testaceous, with the striae deeply impressed at the apex, the setigerous impressions on the interstices 3 and 5 extended forward to the base.

35. **Statira sphenodera,** n. sp. (Plate XII, fig. 16, ♂.)

Very elongate, narrow, shining; piceous, the prothorax, under surface, and sometimes the femora at the base, rufous or rufo-testaceous, the elytra with a translucent greenish or cupreous lustre, the latter with a few bristly hairs towards the apex. Head long, narrow, somewhat closely punctate, shallowly, longitudinally, grooved between the eyes, the latter very large and subapproximate, the neck rugose; antennae very long and slender in both sexes, joint 11 in ♂ equalling about five, in ♀ rather more than three, of the preceding joints united. Prothorax elongate, narrow, subconical, sinuate at the sides before the base, the basal and apical margins slightly raised; closely, finely, irregularly punctate. Elytra very elongate, twice as wide as the prothorax, subparallel, acuminate at the apex; finely punctato-striate, the interstices almost flat, 1, 3, 5, 7, and 9 each with two or three setigerous impressions towards the tip. Legs very elongate, slender, the femora gradually thickened to near the apex in both sexes.

Lengt $12\frac{1}{4}$–$13\frac{3}{4}$, breadth 3–$3\frac{3}{4}$ mm. (♂♀.)

Hab. Brazil (*Mus. Oxon.*), Rio de Janeiro (*Fry*), Pernambuco (*ex coll. F. Bates*).

Seven specimens. A very elongate, narrow insect, not unlike *S. longicollis*, Mäkl., and easily recognisable by its long, subconical, red prothorax, very elongate, slender antennae, with an extremely elongate terminal joint in ♂, the metallic elytra, with the interstices smooth to near the apex, and the simple legs in both sexes. The general facies is that of an *Agra*.

36. **Statira stenocephala,** n. sp.

♂. Very elongate, narrow, shining; nigro-piceous, the femora paler at the base, the apical margin of ventral segments 3 and 4 testaceous, the elytra with a cyaneous lustre, the latter with a few bristly hairs at the tip. Head oblong, narrow, sparsely punctate, foveate in the middle between the eyes, and with two small foveae on each side adjacent to them, the eyes rather small (as seen from above), somewhat distant; antennae long, quite slender, joints 7–10 rapidly decreasing in length, 11 rather longer than 6–10 united. Prothorax a little wider than the head, much longer than broad, subcylindrical, slightly narrowed and constricted before the apex, and very feebly sinuate at the sides before the base, the basal margin a little raised, the hind angles not prominent; very sparsely, finely, irregularly punctate, the disc transversely depressed on each side before and behind the middle, and indistinctly so in the centre at the base. Elytra elongate, scarcely twice the width of the prothorax, subparallel to far beyond the middle, rounded at the tip; closely, finely striato-punctate, striate at the apex, the interstices flat, transversely wrinkled, without definite coarser setigerous impressions on the alternate interstices. Legs long, slender, the anterior femora feebly clavate.

Length 10, breadth $2\frac{1}{2}$ mm.

Hab. BRAZIL (*Mus. Brit.*).

One male, acquired by the Museum in 1871. An isolated form, recognisable by its narrow head, slender antennae, long, cylindrical, polished prothorax, and nigro-cyaneous, long, subparallel, non-foveolate elytra. It bears some resemblance to *Hypostatira variicolor*, Fairm., from Minas Geraes,[11] but the present insect cannot be referred to that genus as defined by its describer.

37. **Statira viridinitens**, n. sp.

♀. Very elongate, somewhat convex, polished; head and prothorax nigro-piceous, the elytra brilliant metallic green, with cupreous or golden reflections at the sides and apex, the legs, antennae, and under surface piceous, the elytra with a few long, bristly hairs. Head almost smooth (the covered rugose neck excepted), foveate in the middle between the eyes, the latter moderately large, separated by the width of one of them as seen from above; antennae extremely slender and elongate, the joints slightly thickened at the tip, 11 equalling 9 and 10 united. Prothorax about as wide as the head, not longer than broad, cordate, almost smooth, the basal margin laterally projecting, raised. Elytra very elongate, at the base twice as broad as the prothorax, gradually widening to beyond the middle, acuminate posteriorly, the apices pointed; closely, finely punctato-striate, the interstices broad, almost flat, 3, 5, and 7 with several widely separated setigerous impressions scattered

[11] There is a specimen apparently referable to this species in the Oxford Museum.

between the base and apex, 9 also with three impressions towards the tip. Legs very long and slender, the femora moderately thickened.

Length 12, breadth $3\frac{1}{2}$ mm.

Hab. COLOMBIA (*ex coll. F. Bates*).

One female. An insect with brilliantly metallic elytra, as in *S. sumtuosa*, Mäkl., and other allied Colombian and Ecuador forms, the head and prothorax relatively short, the elytra very long, posteriorly acuminate, and mucronate at the tip, the antennae and legs as slender as in *Othryades fragilicornis*, Champ., from Panama. The last-named species has the mandibles tridentate at the tip, which is apparently not the case in the present insect, so far as can be ascertained without opening them. *S. angustata*, Pic, from Ecuador, must have equally slender antennae.

38. **Statira aegrota.**

♂. *Statira aegrota*, Mäkl., Act. Soc. Fenn. vii, p. 149 (1862).

♂. Antennae simple, joint 11 about equalling 7–10 (in ♀ 8–10) united; anterior femora stout; intermediate femora gradually thickened to beyond the middle and slightly hollowed thence to the apex.

Hab. BRAZIL (*Mus. Oxon.*), Rio de Janeiro (*Fry*), Espirito Santo (*Schmidt*).

Four specimens before me are probably referable to this species. They differ from Mäklin's description in having the small rounded tubercles preceding the setigerous impressions placed on the alternate interstices 1, 3, 5, and 9, instead of on 1, 3, 5, and 7, as stated. The tubercles are distributed along the whole length of the three dorsal interstices mentioned, varying greatly in number, but on the ninth they are reduced to a short series near the apex. An elongate reddish insect, with the elytra translucent green or bluish-green, the prothorax sometimes infuscate; the head broad, almost smooth, unimpressed between the eyes, the latter large and somewhat distant; the antennae slender; the prothorax cordate (♀) or oblongo-cordate (♂), densely punctulate, with very prominent basal margin; the elytra finely punctato-striate, the interstices (except just in front of the setigerous impressions) almost flat; the femora and tibiae simple in ♂. *S. rubrithorax*, Pic,[12] from San Antonio da Barra, Brazil, seems to be an allied form

[12] Mélanges exot.-entom. iv, p. 14 (Sept. 1912).

with a subopaque head and prothorax, and black antennae, knees, tibiae, and tarsi.

39. **Statira scintillans,** n. sp.

♂. Elongate, narrow, very shining; aeneo-piceous, the head, antennae, and legs reddish; the head and elytra with numerous very long, suberect bristly hairs, the antennae also setose. Head rather small, sparsely punctulate, longitudinally grooved between the eyes, the latter large and narrowly separated; antennae long, slender, joint 11 extremely elongate, about equalling 3–10 united. Prothorax as wide as the head, much longer than broad, rounded at the sides, obliquely narrowed from the middle forward, and constricted before the prominent basal margin; closely, very minutely punctate. Elytra long, nearly twice as wide as the prothorax, subparallel in their basal half, flattened and uneven on the disc; very minutely striato-punctate, the interstices broad, flat, 1, 3, 5, 7, 9 with from six to ten setigerous impressions scattered between the base and apex, the impressions each preceded by a small tubercle, these becoming slightly elongated towards the tip. Legs rather stout, the femora strongly clavate, the tibiae slightly curved at the base.

Length 7, breadth $2–2\frac{1}{10}$ mm.

Hab. AMAZONS, Santarem, Ega (*H. W. Bates*).

Two males. A narrow, elongate form related to the Colombian *S. sumtuosa*, Mäkl., but much smaller, with the apical joint of the ♂-antenna nearly half the length of the entire organ, and the surface of the elytra so uneven as to appear scintillate.

40. **Statira sphenoptera,** n. sp.

♂. Elongate, narrow, attenuate posteriorly, rather dull, the elytra and under surface shining; black, the elytra cyaneous on the disc, aeneous at the sides, the antennae (joints 1–3 excepted) and legs (the black knees excepted) testaceous, the abdomen piceous; the elytra with scattered long, erect, bristly hairs. Head large, broader than the prothorax, densely, very finely punctate, the eyes extremely large, narrowly separated; antennae long, slender [joints 10 and 11 missing]. Prothorax much longer than broad, cordate, strongly constricted before the raised, laterally-projecting basal margin; densely minutely punctate, transversely excavate in the centre at the base. Elytra moderately long, less than twice the width of the prothorax, narrowing from the base, unarmed at the tip; very finely, closely, punctato-striate, the interstices feebly convex, 1, 3, and 5 with a series of eight or nine setigerous impressions, each preceded by a small tubercle, scattered between the base and apex, and 9 with four small tubercles along the apical half. Legs long, slender, the anterior femora stouter than the others.

Length 8, breadth 2 mm.

Hab. Upper Amazons, Ega (*H. W. Bates*).

One male. A narrow, graceful form, with a black head and prothorax, very large, subapproximate eyes, subcuneiform, tuberculate, blue elytra, and long, flavescent legs, the black knees excepted.

41. Statira sumtuosa.

Statira sumtuosa, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 350 (1878).

♀. Elongate, widened posteriorly, shining; nigro-piceous, the elytra brilliant greenish-aeneous, the elytral depressions and apex golden-cupreous in certain lights, the antennae and legs rufo-piceous; the elytra with a few long, bristly hairs. Head sparsely, very finely punctate, longitudinally depressed in the middle between the eyes, the latter very large, somewhat narrowly separated; antennae slender, joint 11 equalling 8–10 united. Prothorax a little wider than the head, about as long as broad, moderately rounded at the sides, constricted before the raised basal margin; closely, conspicuously punctate, shallowly, interruptedly sulcate down the middle, and with an oblique depression on each side of the disc posteriorly. Elytra long, widening to beyond the middle, twice as broad as the prothorax, flattened on the disc below the base, and longitudinally depressed within the humeri; extremely finely, shallowly striato-punctate, the punctures becoming obsolete towards the apex; the interstices flat, 1, 3, 5, 7, and 9 each with a scattered series of small setigerous impressions, most of which are placed in large, broad, shallow, coalescent foveae, the interspaces between those on 7 and 9 carinate. Legs long and slender.

Length $12\frac{1}{2}$, breadth $3\frac{4}{5}$ mm.

Hab. Colombia (*ex coll. F. Bates*).

One specimen, agreeing well with Mäklin's description, so far as it goes. Recognisable by the brilliantly metallic uneven elytra, with interruptedly carinate seventh and ninth interstices, the closely punctured, interruptedly sulcate prothorax, and slender limbs. The femora are probably abraded.

42. **Statira chalcoptera**, n. sp.

Elongate, widened posteriorly, very shining; nigro-piceous or black, the elytra brilliant brassy-green, partly cupreous when viewed in certain lights, the legs rufo-testaceous, the antennae ferruginous or fusco-ferruginous; the elytra with a few long bristly hairs. Head rather narrow, not wider than the prothorax, sparsely, minutely punctate, obsoletely impressed in the middle between the eyes, the latter very large, somewhat narrowly separated; antennae long, slender, joint 11 in ♀ equalling 8–10 united [broken off in ♂]. Prothorax slightly longer than broad, rounded at the sides, moderately constricted before the prominent basal margin; sparsely, minutely punctate (almost smooth in one example), with a deep, oblong-triangular excavation in the middle at the base and an oblique impression on each side of it anteriorly. Elytra long, widening to beyond the middle and there more than twice the width of the prothorax, transversely excavate below the base, and also longitudinally depressed within the humeri; extremely finely, shallowly striato-punctate, the interstices flat, 1, 3, 5, 7 and 9 each with a scattered series of small, shallow, setigerous impressions, the impressions on 7 and 9, and those towards the apex of 1, placed in large shallow foveae. Legs long; anterior and intermediate femora sparsely ciliate beneath.

Length $11\frac{1}{2}$–$12\frac{1}{2}$, breadth $3\frac{4}{5}$ mm. (♂♀.)

Hab. Colombia (*Mus. Brit.*).

Two examples, one with the head and prothorax almost smooth. This is a form of *S. sumtuosa*, Mäkl., with the elytra deeply excavate below the base, the broad, shallow, foveiform depressions on the disc restricted to the sides and apex, and the short carinae between them on the interstices 7 and 9 wanting; the prothorax deeply triangularly excavate in the middle at the base; and the legs wholly red.

43. **Statira cavernosa**, n. sp.

♀. Elongate, depressed, widened posteriorly, shining; nigro-piceous, the elytra metallic green, the depressions, sides, and apex aeneo-cupreous, the legs fusco-castaneous, the mandibles rufescent; the elytra with scattered, erect, bristly hairs. Head a little broader than the prothorax, very minutely punctate, with a shallow fovea in the middle between the eyes, the latter moderately large, distant; antennae slender, moderately long, joint 11 equalling 9 and 10 united. Prothorax slightly longer than broad, narrow, oblongo-cordate, constricted before the prominent basal margin; closely, excessively minutely punctate. Elytra long, compressed below the humeri, widening to beyond the middle and there three times the breadth of the prothorax, transversely depressed below the base, and with a deep, oblique post-basal excavation; minutely, sinuously, striato-punctate, the interstices flat, 3, 5, 7, and 9 each with four or five large, shallow, setigerous impressions on the apical half, 1 transversely notched along the suture and also with three or four foveae towards the tip, the larger impressions each preceded by a small tubercle or short carina, the carina on 7 extending uninterruptedly forward to the humeral callus. Legs long, slender, the femora bare.

Length $9\frac{1}{10}$, breadth 3 mm.

Hab. COLOMBIA (*Mus. Brit.*).

One specimen, acquired in 1847. Near *S. impressipennis*, Mäkl., with a narrower, oblong, smoother prothorax, smaller eyes, and very minutely striato-punctate, uneven elytra, the large shallow setigerous impressions on the apical half diverting the linear arrangement of the striae, the spaces between the impressions interruptedly carinate or catenulate. *S. sumtuosa* is an allied larger insect.

44. **Statira impressipennis.**

Statira impressipennis, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 351 (1878).

Elongate, depressed, widened posteriorly, very shining; nigropiceous, the head and prothorax with an aeneous lustre, the elytra metallic green, brassy at the tip, the tarsi and joint 11 of the antennae ferruginous; the elytra with numerous very long, erect, bristly hairs. Head narrower than the prothorax, sparsely, finely punctate, deeply foveate in the middle between the eyes, the latter very large, somewhat narrowly separated; antennae slender, rather short, joint 11 equalling 8–10 united. Prothorax not longer than broad, rounded at the sides, constricted before the prominent basal margin; somewhat closely, finely punctate. Elytra very long, twice as broad as the prothorax, widening to beyond the middle, broadly depressed for some distance below the base; closely, very finely, shallowly, punctato-striate throughout, the interstices flat, 1 (except along median third), 3, 5, and 9 with numerous setigerous impressions scattered between the base and apex, 9 interruptedly costate posteriorly. Legs very long, slender; anterior and intermediate femora finely ciliate beneath; tibiae pilose within.

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

Hab. COLOMBIA (*Mus. Brit.*).

One specimen, almost certainly referable to *S. impressipennis*, Mäkl., the type of which was found by Steinheil in the same country. It is related to his *S. sumtuosa* and other Colombian forms.

45. **Statira cupreoviridis**, n. sp.

Elongate, rather narrow, depressed, shining; black with an aeneous lustre, the elytra brilliantly metallic green or golden-green at the base, cupreous from the middle onwards, the antennal joints 4–11 obscure ferruginous, the tarsi rufo-testaceous; the elytra and abdomen with a few long bristly hairs. Head small, not wider than the prothorax, very sparsely, finely punctate, deeply foveate in the middle between the eyes, the latter large, separated by about half the width of one of them; antennae slender, joint 11 in ♀ [that of ♂ wanting] slightly longer than 8–10 united. Prothorax narrow, longer than broad, obliquely narrowed anteriorly, and deeply constricted before the prominent basal margin; sparsely, minutely punctate, depressed in the middle at the base. Elytra long, flattened, more than twice the width of the prothorax, subparallel in their basal half, the humeri prominent and with a deep oblique depression; very finely striato-punctate, the interstices broad, flat, feebly convex at the apex, 3 with five or six widely scattered, 5 and 7 each with two on the apical half, and 9 with one at the middle, setigerous impressions, each of which is placed in a large shallow fovea, 9 also with several other impressions towards the tip. Legs long, slender, anterior femora feebly clavate.

Length $9\frac{1}{2}$–$10\frac{3}{4}$, breadth 3–$3\frac{1}{3}$ mm. (♂♀.)

Hab. PERU, Chanchamayo (*ex coll. F. Bates*).

One pair, the tip of the antennae wanting in one of them. A brilliantly metallic insect allied to the Colombian *S. sumtuosa*, Mäkl., with a narrower head and prothorax, differently sculptured elytra, and rufo-testaceous tarsi. The large shallow foveae on the apical half of the elytra give an uneven appearance to the surface; the general shape is like that of an *Agra*, fam. Carabidae.

46. **Statira vigintipunctata**, n. sp.

Elongate, widened posteriorly, shining; black, the elytra metallic green, cupreous at the sides and apex, the antennae (except at the base) obscure ferruginous, the legs nigro-piceous; the elytra with a few very long bristly hairs. Head small, closely, finely punctate, the eyes moderately large, distant; antennae slender, joint 11 equalling 8–10 united. Prothorax about as wide as the head, considerably longer than broad, oblongo-cordate, constricted before the moderately raised basal margin; closely, finely punctate. Elytra long, widening to beyond the middle and there more than twice the width of the prothorax, flattened below the base; closely, finely punctato-striate throughout, the interstices almost flat, convex at the tip, 3 with six, and 5 with four, rather large, deep, setigerous impressions scattered between the base and apex, 9 also with two smaller impressions towards the tip. Legs long; anterior femora moderately clavate.

Length $9\frac{1}{2}$, breadth 3 mm. (♀?)

Hab. Peru, Chanchamayo (*ex coll. F. Bates*).

One specimen. Differs from *S. cupreoviridis*, from the same locality, in having the elytra shorter, less brilliantly coloured, punctato-striate to the apex, and with the setigerous impressions smaller, deeper, and otherwise arranged, the head and prothorax closely punctate, the tarsi infuscate. The sharply-defined elytral foveae are suggestive of those of various species of the Carabid-genus *Pterostichus*.

47. **Statira semicuprea**, n. sp.

Elongate, widened posteriorly, somewhat robust, shining; piceous, the elytra aeneous at the base, the colour changing to cupreous from about the basal third onwards, the cupreous coloration enclosing an oblong green patch on the disc near the tip; the elytra with a few long bristly hairs. Head short, barely as wide as the prothorax, closely, finely punctate, the eyes large, distant; antennae moderately long, slender [tip broken off]. Prothorax transverse, rounded at the sides, deeply constricted before the prominent basal margin; closely, finely punctate. Elytra long, broad, more than twice the breadth of the prothorax, gradually widened to the middle, and somewhat acuminate posteriorly; very finely, closely striato-punctate, the interstices broad, flat, 3 with four or five, and 5 with three, large setigerous impressions towards the apex, 9 also with a series of impressions down the apical half, the interspaces between them cariniform. Anterior femora moderately clavate.

Length $11\frac{1}{5}$, breadth $3\frac{4}{5}$ mm. (♀?)

Hab. Peru, Chanchamayo (*ex coll. F. Bates*).

One specimen. Larger than the Central American *S. glabrata*, Mäkl., with more elongate, smoother, partly cupreous, apically foveolate elytra, more slender antennae, a less constricted prothorax, simple anterior femora, etc.

The elytral sculpture is rather like that of *S. cupreoviridis*, the large setigerous impressions, however, in the present species are mostly placed near the apex.

48. **Statira splendicans.**

♀. *Statira splendicans*, Mäkl., Act. Soc. Fenn. vii, p. 151 (1862).

Very like *S. micans*, Mäkl. (No. 29), the alternate elytral interstices not catenulate towards the apex, 1, 3, and 5 with a scattered series of setigerous impressions, those on 7 wanting, 9 with two or three impressions near the tip; head a little broader, the inter-ocular groove only just indicated, the eyes more distant; antennal joint 11 in ♂ equalling 7–10, in ♀ 8–10, united; legs slender, simple in ♂; aedeagus slender, thickened and slightly hooked at the tip above.

Hab. Brazil (*Mus. Oxon.*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857), Rio de Janeiro (*Fry*), Minas Geraes (*Mus. Oxon.*).

Two males and four females seen.

49. **Statira rotundicollis,** n. sp.

Moderately elongate, somewhat robust, shining; piceous, the head and prothorax with an aeneous lustre, the elytra brassy, the antennae obscure ferruginous, the elytra with a few long, bristly hairs. Head about as wide as the prothorax, almost smooth, a transverse foveate depression between the eyes excepted, the latter large, distant; antennae slender, joint 11 nearly as long as 7–10 united. Prothorax convex, about as broad as long, strongly rounded at the sides, deeply constricted before the prominent basal margin; sparsely, very minutely punctate. Elytra long, twice as broad as the prothorax, gradually widened to the middle, and somewhat acuminate posteriorly; closely, finely, deeply punctato-striate, the interstices becoming more convex towards the apex, 3 with five, and 5 with three or four, widely scattered, setigerous impressions, 7 also with one at the shoulder and 9 with two impressions near the tip. Anterior femora clavate; anterior tibiae feebly curved.

Length $8\frac{1}{2}$, breadth $2\frac{1}{2}$ mm. (♂?)

Hab. Colombia, Bogota (*Mus. Brit.*).

One specimen. Narrower than the Central American *S. glabrata*, Mäkl., the prothorax not wider than the head, the anterior femora unarmed, the elytra more deeply striate, with the interstices convex at the apex. More shining than *S. puncticeps* (No. 53), the head and prothorax almost smooth, the latter deeply constricted before the base.

50. **Statira divisa,** n. sp.

Elongate, depressed, widened posteriorly, very shining; obscure testaceous, the head, antennae, and palpi in great part piceous; the elytra of a brilliant brassy tint, tinged with cupreous along the inferior margin, the suture testaceous throughout, the testaceous coloration gradually becoming more extended towards the apex; the elytra with a few long bristly hairs. Head about as wide as the prothorax, sparsely, minutely punctate, shallowly foveate in the middle between the eyes, the latter moderately large, distant; antennae long, slender, joint 11 barely the length of 8–10 united. Prothorax about as broad as long, rounded at the sides, constricted before the raised basal margin; very sparsely, obsoletely punctulate. Elytra long, widening to beyond the middle, and there more than twice the width of the prothorax, subacuminate posteriorly, depressed below the base, and with an oblique intra-humeral depression; closely, minutely punctato-striate, the sutural stria deeply impressed at the apex, the interstices flat, 3 with about eight, 5 with four or five, and 9 with numerous, deep setigerous impressions scattered throughout their length, and 1 with two small impressions near the tip. Legs long, slender, the femora glabrous.

Length 8½, breadth 3 mm. (♀?)

Hab. Venezuela (*Dyson*, in *Mus. Brit.*).

One specimen, somewhat immature and discoloured, but otherwise perfect, acquired in 1847. Smaller than the Colombian *S. impressipennis*, Mäkl., the prothorax narrower, the elytra testaceous along the suture, with fewer setigerous impressions on the disc, the femora glabrous (? abraded), etc. The numerous deep impressions scattered along the whole length of the ninth elytral interstice is a marked feature of the present species. The much larger *S. nubeculosa*, Mäkl. (length 13 mm.), from Colombia, also has a sutural stripe.

51. **Statira diluta,** n. sp.

Elongate, shining; piceous or rufo-castaneous, the antennae and legs paler, the femora slightly infuscate, the elytra with a cupreous or greenish lustre, the latter with a few bristly hairs towards the apex. Head as broad as the prothorax, sparsely, very minutely punctate, with several coarser punctures between the eyes, the latter moderately large, distant; antennae slender, long, joint 11 nearly or quite equalling 8–10 united. Prothorax about as long as broad, rounded at the sides, deeply constricted before the raised basal margin; sparsely, very minutely punctate. Elytra long, flattened on the disc, twice as broad as the prothorax, gradually widened to the middle, and somewhat acuminate posteriorly; closely, finely, shallowly punctato-striate to the tip, the interstices broad, flat, 3, 5, 7, and 9 each with from two to four setigerous impressions on the apical half (those on 7 wanting in one specimen).

Length $9\frac{1}{2}$–$10\frac{1}{2}$, breadth 3–$3\frac{2}{3}$ mm.

Hab. ECUADOR, Macas (*Buckley*).

Three specimens, possibly including the two sexes. Near the Venezuelan *S. divisa*, the elytra uniformly coloured, simply flattened on the disc, the setigerous impressions on the interstices 3, 5, and 9 fewer in number and mostly placed near the apex. The much smoother, polished prothorax separates *S. diluta* from *S. lateralis* (No. 71), *simonis*, *suffusa* (No. 72), *caeruleotincta* (No. 59), etc.; and its larger size and more elongate elytra from *S. translucida* (No. 56).

52. **Statira simonis.**

Statira simonis, Fairm., Ann. Soc. Ent. Fr. 1892, p. 95.

Elongate, somewhat depressed, widened posteriorly, shining; rufo-testaceous, the eyes black, the elytra with a faint brassy lustre, the latter with a few long bristly hairs. Head not so broad as the prothorax ;closely punctulate, transversely impressed between the eyes, the latter moderately large, distant; antennae slender, long, joint 11 not quite equalling 8–10 united. Prothorax a little broader than long, moderately rounded at the sides, deeply constricted before the raised basal margin; densely, finely punctate, transversely grooved on each side of the disc just behind the middle, the basal groove complete. Elytra long, twice the breadth of the prothorax, widening to beyond the middle, the sides arcuately converging thence to the apex; closely, very finely striato-punctate, the interstices broad and flat throughout, 3 with six (scattered between the base and apex), 5 with four (on the apical half), and 9 with three (towards the apex), large, deep setigerous impressions. Anterior femora moderately clavate.

Length 10, breadth $3\frac{1}{3}$ mm. (♀?)

Hab. Venezuela (*Dyson*), San Esteban, Colonia Tovar (*Simon*: type).

One specimen, acquired by the Museum in 1847, agreeing with the description of *S. simonis*, Fairm. Near *S. lateralis*, Mäkl. (as here identified), and separable therefrom by the broader, laterally-grooved prothorax, and the very finely, shallowly striato-punctate elytra, the interstices of which are flat throughout, 3, 5, and 9 with a few large deep setigerous impressions. *S. divisa* from Venezuela, *S. caeruleotincta*, from Colombia (No. 59), and *S. testacea* and *S. aeneotincta*, from Central America, are also allied forms.

53. **Statira puncticeps,** n. sp.

Moderately elongate, narrow, feebly shining; greenish-aeneous, the antennae, legs, and under surface in great part or wholly piceous; the head and elytra with scattered long, erect, pallid, bristly hairs. Head rather small, somewhat coarsely, closely punctate, smoother in the middle between the eyes, the latter large and well separated; antennae slender, long, shorter in ♀, joint 11 in ♂ about equalling 7–10, in ♀ barely as long as 8–10, united. Prothorax oblong, longer than broad, as wide as the head, constricted before the base, the basal margin moderately raised; closely, conspicuously punctate, without trace of median channel, the interspaces alutaceous. Elytra rather long, about twice as broad as the prothorax, subparallel at the base; closely, finely, rather deeply punctato-striate, the interstices becoming convex towards the apex, 3 with six or seven, and 5 with four or five, setigerous impressions scattered between the base and apex, 9 also with two impressions near the tip. Anterior femora strongly clavate.

Var. *α*. Antennae (joints 1 and 2 excepted) rufo-testaceous. (♂.)

Var. *β*. Prothorax and abdomen rufo-piceous, legs and antennae (joints 1 and 2 excepted) rufo-testaceous. (♀.)

Var. *γ*. Prothorax, a large apical patch on the elytra extending narrowly up the suture to the base, antennae (joints 1 and 2 excepted), legs, and under surface ferruginous or rufo-testaceous. (♂.)

Length 7–9, breadth 2–3 mm. (♂♀.)

Hab. Brazil, Rio de Janeiro (*Fry*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857: type).

Four males and two females, certainly belonging to one variable species, the darker examples (♂♀) selected as types. More elongate than the equally variable *S. inconstans*, Champ., from Central America, the elytra subparallel in male, the head and prothorax closely, conspicuously punctate, the eyes larger and more approximate. The longer elytra, with deeper striae and more numerous setigerous impressions, the more coarsely punctured head and prothorax, the latter without trace of median groove, easily separate *S. puncticeps* from *S. sericea* (No. 65). The colour of the antennae and legs proves to be of no value as a specific character in the present species. *S. flavicornis*, Mäkl., must be a very different insect.

54. **Statira gratiosa.**

Statira gratiosa, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 353 (1878).

♂. Elongate, narrow, shining; rufo-castaneous, the antennae (joint 11 excepted) and upper surface darker, the elytra brilliant violaceo-cupreous, metallic green along the suture and at the sides, the green coloration extending across the base. Head small, not wider than the prothorax, coarsely, closely punctate, smoother in front, the eyes moderately large and separated by about half the width of one of them; antennae rather slender, joint 11 extremely elongate, about equalling 4–10 united. Prothorax longer than broad, oblongo-cordate, as wide as the head, constricted before the rather prominent basal margin; closely, conspicuously punctate. Elytra moderately long, twice as wide as the prothorax, subparallel at the base, narrowing from before the middle to the apex, the intrahumeral depression oblong, deep; minutely striato-punctate, the punctures becoming still smaller towards the tip, the interstices quite flat throughout, 3 with six large, shallow setigerous impressions scattered between the base and apex, 9 with two smaller impressions near the tip. Legs sparsely pilose; femora ciliate with long hairs beneath, the anterior pair strongly clavate.

Length $7\frac{1}{2}$, breadth $2\frac{1}{4}$ mm.

Hab. Colombia (*Mus. Brit., ex coll. F. Bates*).

One male, assumed to be referable to Mäklin's *S. gratiosa*; but as the author does not mention the sculpture of the head and form of the antennae, and describes the body as black (an unimportant character), the identification is not altogether certain. *S. cupripennis*, also found by Steinheil in Colombia, is said to have similarly cupreous and golden-green elytra, with setigerous impressions on the interstices 3, 5, and 7, an almost smooth prothorax, etc. The specimen here described is one of two Colombian insects from the F. Bates collection labelled "*S. viridipennis*, Dej.," a name used by Serville for a very different

Brazilian form. The present species is nearly allied to the Central-American *S. variabilis*, Champ., which has ciliate anterior femora in both sexes.

55. **Statira dejeani,** n. sp.

Statyra viridipennis, Dej. Cat., 3rd edit., p. 236 (1837) (*nec* Serv.).

♂. Elongate, narrow, shining; castaneous, the elytra translucent metallic green, except along the suture posteriorly. Head closely, rather coarsely punctate, the eyes large and somewhat narrowly separated; antennae with joint 11 nearly equalling 4–10 united. Prothorax considerably longer than broad, oblongo-cordate, the basal margin raised; closely, conspicuously punctate. Elytra moderately long, narrowing from the middle, the oblong intra-humeral depression shallow; closely, rather finely punctato-striate, the sutural stria deeply impressed posteriorly, the interstices flat, 3 with five widely separated deep setigerous impressions scattered between the base and apex, 9 also with two smaller impressions towards the tip. Femora sparsely ciliate, the anterior pair clavate.

Length $7\frac{1}{4}$, breadth $2\frac{1}{4}$ mm.

Hab. Colombia, Carthagena (*ex coll. F. Bates*).

One male, from the Dejean collection, and included by him under *S. viridipennis*. Extremely like *S. gratiosa*, but with the elytra translucent metallic green (except along a common elongate space on the disc posteriorly), more coarsely punctato-striate, and with the similarly-placed setigerous impressions deeper and less extended laterally; the prothorax longer, and less rounded at the sides; and the head a little more sparsely punctured; the eleventh antennal joint slightly shorter. *S. terminalis*, Mäkl., must be similarly coloured.

56. **Statira translucida,** n. sp.

Moderately elongate, widened posteriorly, shining; rufo-testaceous, the eyes black, the palpi sometimes more or less infuscate, the elytra (the epipleura excepted) suffused with green or golden-green, the latter with a few long, erect, bristly hairs. Head sparsely, minutely punctate, obsoletely foveate in the middle between the eyes, the latter distant, moderately large; antennae rather slender, joint 11 in ♂ nearly as long as 8–10 united, in ♀ a little shorter. Prothorax almost or quite as wide as the head, about as broad as long, cordate, strongly constricted before the prominent hind angles, the basal margin feebly raised; sparsely, minutely punctate. Elytra moderately long, twice as broad as the prothorax, widened to the middle, and rapidly narrowed thence to the somewhat acuminate apex, transversely depressed below the base; closely, finely punctato-striate, the interstices becoming convex towards the apex, 3 with from five to eight, and 5 and 9 with four or five setigerous impressions (those on 3 and 5 scattered between the base and apex), 1 also with one or two impressions near the tip.

Length $6\frac{1}{5}$–$7\frac{3}{4}$, breadth $2\frac{1}{5}$–$2\frac{1}{2}$ mm. (♂♀.)

Hab. BRAZIL (*Mus. Oxon.*), Rio de Janeiro [type] (*Fry*), Petropolis (*J. Gray* and *H. Clark*, Jan. 1857), Espirito Santo (*Descourtils*).

Nine specimens seen, including the three in the Oxford Museum. A rather small, rufo-testaceous form, with dilute golden-green or green, very shining elytra, which in both sexes are widened towards the middle and acuminate posteriorly, slender antennae, and a relatively narrow head and prothorax. Mäklin's description of *S. subaenea*, from Santa Catharina, nearly applies to the present insect; but the former is said to have the head shallowly, longitudinally foveate between the eyes, the basal margin of the prothorax moderately raised, the elytra linear or very feebly widening in their basal two-thirds, and the five setigerous impressions on their third interstice restricted to the apical half. *S. cupreotincta*, Champ., from Panama, is a larger and more elongate insect, with a wider prothorax and less uniformly coloured elytra, the latter with much larger setigerous impressions.

57. **Statira subglabrata**, n. sp.

Moderately elongate, widened posteriorly, shining; rufo-testaceous or testaceous, the eyes black, the elytra aeneo-piceous, the latter almost glabrous. Head sparsely, minutely punctate, the eyes moderately large, distant; antennae rather stout, comparatively short, joint 11 not or very little longer than 9 and 10 united. Prothorax as wide as the head, about as long as broad, cordate, slightly dilated at the base, the basal margin feebly raised; sparsely, minutely punctate, finely, obsoletely canaliculate on the disc anteriorly. Elytra not very elongate, in their widest part twice as broad as the prothorax, gradually dilated to the middle, and arcuately narrowed posteriorly; closely, finely punctato-striate, the interstices feebly convex, 3 with three or four widely scattered setigerous impressions along their apical half, and 9 usually with one or two impressions near the tip.

Length $4\frac{4}{5}$–$6\frac{1}{4}$, breadth $2\frac{1}{5}$–$2\frac{1}{4}$ mm. (♂♀.)

Hab. Amazons, Ega, Santarem [type] (*H. W. Bates*).

Seven examples, including three males with the aedeagus partly exposed. This insect is of about the same size and shape as *S. viridicincta* (No. 96), differing from it in having uniformly aeneo-piceous elytra, with the setigerous impressions on the disc reduced to three or four on the apical half of the third interstice, shorter and stouter antennae, with the terminal joint not much longer than 9 and 10 united in ♂, and an obsoletely canaliculate prothorax.

58. **Statira caliensis,** n. sp.

Moderately elongate, depressed, shining; aeneo-piceous or rufo-piceous with an aeneous lustre; the elytra with a few long, erect, bristly hairs. Head sparsely, very minutely punctate, transversely depressed between the eyes, the latter large and well separated; antennae long, rather stout, joint 11 in ♂ as long as 7–10, in ♀ the length of 8–10, united. Prothorax in ♂ as broad as, in ♀ broader than, the head, not so long as wide, subcordate, strongly constricted before the base, the basal margin prominent and laterally projecting; rather sparsely, minutely punctate. Elytra moderately long, at the middle twice as broad as the prothorax, gradually widened in their basal half; closely, finely crenato-striate, the interstices becoming convex towards the sides and apex, 3 and 5 with scattered conspicuous setigerous impressions along their entire length, 7 also with one, and 9 with two or three, near the apex. Legs rather stout.

Length $8\frac{1}{10}$–9, breadth $2\frac{1}{2}$–3 mm. (♂♀.)

Hab. W. Colombia, Cali (*Rosenberg*).

One pair. Near *S. lateralis*, Mäkl. (No. 71), as here understood but aeneo-piceous in colour, the antennae stouter, and the elytra with a scattered row of setigerous impressions along the interstices 3 and 5 from the base to the apex.

59. **Statira caeruleotincta,** n. sp.

Elongate, somewhat robust, moderately shining; castaneous, the elytra with a translucent bluish lustre on the disc, the colour changing to brassy towards the sides and apex; the elytra with a few bristly hairs. Head nearly as broad as the prothorax, sparsely, minutely punctate, the eyes large, somewhat distant; antennae long, slender, joint 11 as long as 7–10 united. Prothorax rather broad, about as long as wide, rounded at the sides, constricted before the prominent laterally-projecting basal margin; closely, minutely punctate. Elytra long, broad, slightly widening to the middle, about twice as wide as the prothorax, somewhat acuminate at the tip; closely, finely punctato-striate, the interstices flat, 3 with four or five deep setigerous impressions scattered along the apical half, and 5 and 9 also with two or three others towards the tip, 3 and 5 subcatenulate posteriorly. Anterior femora clavate, bare.

Length $9\frac{3}{4}$, breadth 3 mm. (♂?)

Hab. Colombia (*Mus. Brit., ex coll. F. Bates*).

One specimen, from an old French collection. Not unlike the Brazilian *S. rufa* and *S. rufifrons*, Mäkl., the elytra bluish on the disc, the setigerous impressions fewer in number (wanting on the seventh interstice), the head not sulcate as in *S. rufifrons*, the head and prothorax formed much as in *S. laticollis*. The Mexican *S. caeruleipennis*, Champ., is somewhat similarly coloured.

60. **Statira puncticollis**, n. sp.

Moderately elongate, shining; reddish-brown, the femora paler at the base, the eyes black; the elytra with a faint metallic lustre, and bearing a few bristly hairs. Head broad, sparsely, minutely punctate, with a shallow fovea between the eyes, an oblong depression in front of this, and a deep fovea (?accidental) on the epistoma, the eyes very large, narrowly separated; antennae moderately long, rather stout, joint 11 nearly equalling 7–10 united. Prothorax as wide as the head, not longer than broad, subquadrate, strongly constricted before the base, the basal margin raised; closely, very finely punctate, the interspaces polished. Elytra moderately long, at the middle twice as wide as the prothorax, somewhat acuminate posteriorly; closely, finely punctato-striate, the striae deeply impressed at the apex, the interstices flat on the disc, 3 and 5 with from six to eight small setigerous impressions scattered throughout their length, 9 also with two others near the tip.

Length $7\frac{1}{2}$, breadth $2\frac{1}{2}$ mm. (♀?)

Hab. Amazons (*H. W. Bates*).

One specimen, exact locality not given on the label. Near the variable *S. multiformis*, Champ., from Central America, *S. insularis* (No. 77), from Trinidad, and *S. caeruleotincta*, from Colombia, differing from all of them in the interruptedly sulcate inter-ocular portion of the head (the deep fovea on the epistoma being probably accidental), the antennae stouter and the prothorax more shining and less densely punctate than in the first two species, the eyes more approximate and the prothorax not so convex and less rounded at the sides than in *S. caeruleotincta.*

61. **Statira chloroptera,** n. sp.

Elongate, rather convex, robust, very shining; piceous, the elytra brilliant metallic green, the latter with a few very long, erect, pallid, bristly hairs. Head rather small, narrower than the prothorax, almost smooth, the eyes large, distant; antennae moderately long, stout, joint 11 equalling 9 and 10 united. Prothorax broad, transverse, arcuately dilated at the sides, narrowed and deeply constricted posteriorly, the basal margin prominent; almost smooth, transversely excavate in the middle in front, and shallowly, interruptedly grooved down the middle. Elytra long, broad, nearly twice as wide as the prothorax, subparallel in their basal half; with rows of fine, approximate punctures placed in deep striae, the interstices here and there transversely wrinkled, becoming more convex towards the apex, 3, 5, and 9 with several widely separated inconspicuous setigerous punctures. Legs rather stout, anterior femora clavate.

Length 10, breadth $3\frac{1}{3}$ mm. (♀?)

Hab. Peru (*ex coll. Pascoe*).

One specimen. This insect has stout antennae and a short, arcuately dilated prothorax, somewhat as in *S. eurydera* (No. 68), but the general facies is more like that of the much larger *S. ingens*, from Central America. The brilliant metallic green, rather broad elytra, the small head, and somewhat convex body are also characteristic.

62. **Statira canaliculata,** n. sp.

♀. Elongate, shining; rufo-piceous (obscure testaceous in the immature example), the head and legs paler, the elytra with a dilute aeneous lustre, the latter with a few long bristly hairs. Head broad, almost smooth, the eyes large, distant; antennae short, slender, joint 11 nearly equalling 8–10 united. Prothorax not quite so broad as long, a little wider than the head, transversely cordate, strongly constricted before the raised basal margin; very sparsely, finely, unequally punctate, interruptedly canaliculate down the middle, the groove widened before the base. Elytra very long, twice as broad as the prothorax, gradually widening to the middle, and somewhat acuminate posteriorly; closely, finely punctato-striate, the striae deeply impressed at the apex, the interstices almost flat to near the tip, 3 with nine or ten, and 5 with five or six, setigerous impressions scattered throughout their length, 9 also with two or three impressions towards the apex.

Length 11½–12, breadth 3½–4 mm.

Hab. Peru (*ex coll. Fry*), Chanchamayo (*ex coll. F. Bates*).

Two females, possibly obtained by the same collector, Thamm. Narrower than the Brazilian *S. laticollis*, Mäkl. (No. 31); the prothorax much smoother, interruptedly canaliculate on the disc; the elytra relatively longer, with a scattered series of setigerous impressions along the interstices 3 and 5, the latter not catenulate at the apex. The short, convex, conspicuously canaliculate, comparatively smooth prothorax also separates the present species from various other allied species. Compared with the immaculate form of the Colombian *S. trisellata* (No. 103), the eyes are larger, the antennae shorter and not so slender, and the elytra less acuminate at the apex, with the seriate punctures much finer and the interstices almost flat.

63. **Statira caracana**, n. sp.

♂. Elongate, narrow, depressed, very shining, the prothorax duller; head and prothorax aeneous, the elytra brilliant metallic green, the antennae, legs, and under surface black; the head and elytra with a few long, fine, erect, bristly hairs. Head a little wider than the prothorax, sparsely punctulate, foveate in the middle between the eyes, the latter large and somewhat distant; antennae slender, joint 11 equalling 8–10 united. Prothorax longer than broad, subcylindrical, strongly constricted before the prominent basal margin; sparsely, minutely punctate and finely canaliculate, the interspaces alutaceous. Elytra long, about twice as broad as the prothorax, subparallel at the base, very little wider at the middle, the intra-humeral depression oblong, deep; very finely, closely punctato-striate, the interstices broad, flat on the disc, convex at the apex, 3 with four scattered setigerous impressions on the apical half, and 9 with two similar impressions towards the tip. Legs long, slender, the anterior pair with strongly clavate femora, curved tibiae and broadly dilated tarsi, the tarsal joints 2 and 3 transverse.

Length 8, breadth 2½ mm.

Hab. Brazil, Caraca (*P. Germain*).

One example. An insect very like *S. versicolor*, with wholly black legs and antennae, a less deeply canaliculate prothorax, a relatively shorter eleventh antennal joint in ♂, and brilliant metallic green elytra. Compared with *S. sericea*, the elytra are more elongate, the head has a single fovea between the eyes, and the legs and antennae are black. The dilated anterior tarsi are obviously indicative of the male sex. *S. elegans*, Mäkl. (No. 87), is a somewhat similar differently-coloured form.

64. **Statira versicolor**, n. sp.

♂. Elongate, narrow, depressed, shining; piceo-castaneous, the head and prothorax with a faint aeneous lustre; the elytra in the example selected as type metallic blue-green in the sutural region, the colour changing to golden exterior to this, and to cupreous along the sides and at the apex, in a second specimen aeneo-cupreous; the head and elytra with a few long, erect, bristly hairs. Head large, a little wider than the prothorax, sparsely, minutely punctate, flattened, punctulate, and laterally impressed between the eyes, the latter large and rather distant; antennae slender, long, joint 11 a little longer than 8–10 united. Prothorax longer than broad, oblongo-cordate, constricted before the prominent basal margin; sparsely, very minutely punctate, the interspaces alutaceous, the disc strongly, interruptedly canaliculate. Elytra long, twice as wide as the prothorax, subparallel in their basal half, the intra-humeral depression oblong, deep; closely, finely punctato-striate, the interstices flat on the disc, convex at the apex, 3 with about four widely separated setigerous impressions on the apical half, 1 and 9 also with a single impression near the tip. Legs long, slender, the anterior pair with the femora moderately clavate and the tibiae feebly curved.

Length $7\frac{4}{5}$–9, breadth $2\frac{1}{3}$–$2\frac{3}{4}$ mm.

Hab. Brazil (*Mus. Oxon.*), Rio de Janeiro (*Fry*: type).

Two males, one of them immature, with the elytra almost uniformly aeneo-cupreous and the legs testaceous. Very near *S. sericea*, the elytra partly cupreous, the prothorax more deeply canaliculate, the head a little broader, the terminal joint of the antenna longer. The strongly canaliculate prothorax, the more metallic elytra, with fewer setigerous impressions (those on the third interstice not extending beyond the middle anteriorly), and the absence of the median sulcus on the head, separate *S. versicolor* from *S. rufifrons*, Mäkl. (No. 34).

65. **Statira sericea,** n. sp.

Moderately elongate, narrow, shining, the prothorax dull; aeneo-piceous, or rufo-castaneous with a faint aeneous lustre, the elytra aeneous or golden-green, becoming cupreous or golden towards the sides and apex, the antennae testaceous, the two basal joints, the eyes, and palpi black or blackish; the elytra with a few long, erect, bristly hairs. Head rather broad, very sparsely, minutely punctate, shallowly bifoveate between the eyes in ♂, the latter large, somewhat distant; antennae slender, rather long, joint 11 in ♂ as long as 7–10, in ♀ equalling 8–10, united. Prothorax narrower than the head, longer than broad, oblongo-cordate, strongly constricted before the raised, laterally prominent, basal margin; sparsely, minutely punctate, the interspaces alutaceous, and finely, distinctly canaliculate down the anterior half. Elytra moderately long, twice as broad as the prothorax, gradually widened to the middle, and obliquely excavate or depressed within the humeri; closely, very finely punctato-striate, the interstices flat on the disc, convex at the apex, 3 with four or five widely scattered setigerous impressions, 9 also with one or two others towards the apex. Legs slender.

Length 6–6$\frac{1}{3}$, breadth 1$\frac{9}{10}$–2 mm. (♂♀.)

Hab. Brazil (*Mus. Oxon.*: ♂), Constancia (*J. Gray* and *H. Clark*, Jan. 1857: type, ♂), Rio de Janeiro (*Fry*: ♀).

Three males and one female. Narrower and less robust than the Central American *S. variabilis*, Champ.; the antennae more slender, testaceous (the two basal joints excepted), with a less elongate apical joint in ♂; the head and prothorax smoother and not so shining, the latter finely canaliculate; the elytra cupreous or golden at the sides, with the seriate punctures finer and the interstices convex at the apex. *S. subaenea*, Mäkl., from Santa Catharina, and *S. gratiosa*, Mäkl., from Colombia, are similarly coloured forms. The upper surface in the present insect is not very highly polished, appearing somewhat sericeous.

66. **Statira purpureipennis.**

Statira purpureipennis, Pic, Mélanges exot.-entom. xi, p. 19 (Nov. 1914).

Hab. Brazil, Jatahy, Prov. of Goyas (*Pujol*).

In the Fry collection there is an example (♀?) of this species from the same locality as the type. It is a very elongate, narrow insect, nigro-piceous in colour, with the elytra moderately shining, purple; the abdomen castaneous; the head and prothorax opaque, and densely scabroso-punctulate, the former large, the latter longer than broad, cordate, with raised, laterally-projecting basal margin; the elytra elongate, subparallel in their basal half, the alternate interstices 1, 3, and 5 with a complete series, and 7 with a row down the apical half, of rather closely placed, setigerous impressions, each of which is preceded by a small tubercle, 9 also with three impressions near the tip; the antennae long and slender [apical joints wanting]; the legs unusually elongate, the anterior femora not much thicker than the others.

67. **Statira umbrosa,** n. sp.

Elongate, rather narrow, opaque; piceous or castaneous, the femora paler at the base, the elytra black, the latter with numerous very long, erect, bristly hairs. Head large, densely, scabroso-punctulate, the eyes very large, moderately distant; antennae slender, long, joint 11 in ♂ about equalling 6–10, in ♀ 8–10, united. Prothorax as wide as the head, longer than broad, cordate, strongly constricted before the raised, laterally-projecting hind angles, the transverse basal groove not extending across the disc; densely scabroso-punctulate. Elytra long, subparallel in their basal half, barely twice the width of the prothorax; closely, finely punctato-striate, the striae deeply impressed at the apex, the interstices more or less convex, alutaceous, 1, 3, and 5 with a scattered series of setigerous impressions extending throughout their length, the impressions each preceded by a small tubercle, 9 also with two impressions near the tip. Legs very long, the tibiae and tarsi pilose; anterior femora strongly clavate, intermediate femora thickened before the apex beneath, and intermediate tibiae widened from near the base and closely pubescent within, in ♂. Penis-sheath very long, stout, curved, concave above, rounded at tip.

Length 10, breadth 3 mm. (♂♀.)

Hab. Brazil, Ceara (*Gounelle*, ♂: type), Jatahy, Prov. of Goyas (*Pujol*, ♀).

Two specimens—a ♂ with the penis-sheath fully extruded, the other assumed to be a ♀ of the same species. Very like *S. purpureipennis*, Pic, also from Jatahy, but with sericeous, opaque, black elytra, and fewer setigerous impressions on the interstices 1, 3, and 5, those on 7 wanting. The sexes differ in the form of the intermediate legs, the anterior femora of the ♂ are also strongly clavate.

68. **Statira eurydera,** n. sp. (Plate XII, fig. 17, ♂.)

Elongate or moderately elongate, robust, shining; rufo-castaneous, castaneous, or piceous, the upper surface more or less aeneous, the elytra usually metallic green, the apical joint of the antennae ferruginous in one or two of the darker examples; the elytra with a few long, erect, bristly hairs. Head short, broad, densely, finely punctate, the eyes very large, narrowly separated; antennae stout, moderately long, joints 3–10 subequal in length, 11 in ♂ about equalling 7–10, in ♀ 8–10, united. Prothorax strongly transverse, as wide as the head, arcuately dilated anteriorly, in some specimens distinctly angulate at about one-third from the apex, margined and rapidly narrowed thence to the deep basal groove, the basal margin much raised and laterally projecting; densely, minutely punctate, the narrow interspaces still more minutely punctate or scabrous. Elytra rather elongate, one-half broader than the prothorax, gradually widened to a little beyond the middle, rounded at the apex; closely, finely punctato-striate, the interstices 3, 5, and 9 with from about six to eight conspicuous setigerous impressions scattered between the base and apex.

Length $6\frac{1}{3}$–$10\frac{1}{3}$, breadth 2–$3\frac{3}{8}$ mm. (♂♀.)

Hab. AMAZONS, Ega [type], Santarem, Para (*H. W. Bates*), Bahia (*Fry*).

Eleven specimens, all but two from the Amazons, these insects varying greatly in size and in the relative length of the elytra. *S. eurydera* is a southern form of the Mexican *S. crassicornis*, Champ., differing from it in the much rougher, more densely punctulate prothorax. The prothorax is obliquely compressed along the flanks posteriorly, so as to appear margined above.

69. **Statira latevittata,** n. sp.

♀. Elongate, narrow, robust, moderately shining; rufous or castaneous, the eyes black, the palpi piceous, the prothorax slightly infuscate, or with the sides piceous, the elytra with a broad metallic green stripe extending down the outer half from the base to near the apex. Head broad, densely, finely punctate, the eyes very large, narrowly separated; antennae moderately long, stout, joints 4–10 slightly increasing in length, 11 as long as 9 and 10 united.

Prothorax as wide as the head, much broader than long, transversely cordate, strongly constricted before the prominent hind angles, the basal margin much raised; densely, finely punctate, the narrow interspaces somewhat scabrous. Elytra long, about one-half broader than the prothorax, very gradually widened to beyond the middle, flattened on the disc, and rounded at the apex; closely, finely striato-punctate, the interstices alutaceous, flat, 3, 5, and 9 with one or two inconspicuous setigerous impressions towards the apex.

Length $6\frac{1}{3}$–8, breadth 2–$2\frac{1}{2}$ mm.

Hab. Amazons, Para (*H. W. Bates*).

Two examples, one with the tips of the antennae wanting. This species has the head, eyes, and antennae shaped as in *S. eurydera*, and the body coloured as in *S. viridivittata*, all three insects inhabiting the Amazon region. The brilliant green lateral stripe on the elytra extends downward to the epipleural margin in *S. latevittata*. The Colombian *S. medialis*, Mäkl., must be an allied form, with a longer and smoother prothorax, the dense puncturing of the latter giving it a scabrous appearance in the Amazonian insect.[13]

70. **Statira viridivittata,** n. sp.

♂. Elongate, narrow, robust, flattened above, shining; rufo-castaneous, the elytra each with a broad golden-green submarginal stripe (between the striae 4 and 7) extending from the base to near the apex, and with a few long, erect, bristly hairs towards the tip. Head not wider than the prothorax, sparsely, minutely punctate, longitudinally impressed between the eyes, the latter very large and somewhat narrowly separated; antennae very stout, rather short, joints 4–10 rapidly decreasing in length, 6–10 transverse, 11 very elongate, about equalling 5–10 united. Prothorax longer than broad, subcylindrical, obliquely narrowed anteriorly and sinuate at the sides before the base, the basal margin not much raised; sparsely, minutely punctate. Elytra long, one-half wider than the prothorax, subparallel in their basal half, rounded at the tip; closely, finely striato-punctate to near the apex, striate posteriorly, the interstices broad, flat on the disc, 3, 5, and 9 with two or three inconspicuous widely scattered fine, setigerous impressions, each of which is preceded by a minute tubercle. Anterior femora strongly clavate.

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

[13] *S. viridilineata*, Pic, Mélanges exot.-ent. xxv, p. 20 (Aug. 1917), from Brazil, is compared with *S. medialis*, Mäkl.; but it is impossible to identify such insects from " descriptions abrégées."

Hab. Amazons, Santarem (*H. W. Bates*).

One male. A robust, elongate, shining, castaneous insect, with a broad brilliant metallic green submarginal stripe on each elytron, the antennae very stout, with the outer joints transverse and the terminal one as long as the preceding six united, the prothorax subcylindrical, the head rather narrow. It is just possible that *S. viridivittata* may be a male of the Colombian *S. validicornis*, Mäkl. (described as subcylindrical, with a narrow green submarginal stripe on the elytra, and very stout antennae, the apical joint equalling 8–10 united); but without comparison of the types, it would be unsafe to refer insects from such distant localities to one species. The general facies is not unlike that of *S. presuturalis*, Pic.

71. Statira lateralis.

Statira lateralis, Mäkl., Öfv. Finska Vet.-Soc. Förh., xx, p. 357 (1878).

♀. Elongate, depressed, widened posteriorly, shining; testaceous, the eyes black, the elytra with a faint, indeterminate, metallic green marginal stripe extending from the base to about two-thirds of their length and curving inwards to the middle of the disc posteriorly; the elytra with a few bristly hairs near the apex. Head large, sparsely, minutely punctate, with a shallow arcuate impression between the eyes, the latter large, well-separated; antennae slender, rather short, joint 11 equalling 8–10 united. Prothorax about as wide as the head, as long as broad, cordate, dilated at the base, the basal margin prominent; closely, finely, conspicuously punctate. Elytra elongate, twice as broad as the prothorax, widening to beyond the middle, and somewhat acuminate at the apex; closely, finely punctato-striate, the interstices becoming convex towards the apex, 3 only with one or two setigerous impressions near the tip.

Length 9, breadth 3 mm.

Hab. Colombia [type], Ibague (*Mus. Brit.*).

One example, labelled with the MS. name *S. scapularis*, Germ. This insect agrees with Mäklin's diagnosis of *S. lateralis*, but as there are allied forms in Brazil, it is advisable to redescribe the single specimen before me. *S. aeneotincta*, Champ., from Mexico and Guatemala, is of about the same size and shape.

72. **Statira suffusa,** n. sp.

♀. Elongate, depressed, rather narrow, shining; piceous, the antennae, tarsi, bases of the femora, and elytra testaceous, the elytra with a broad, indeterminate, metallic green marginal stripe extending from the base to the apex, the disc with a very faint aeneous lustre; the elytra with a few long, erect, bristly hairs. Head rather narrow, sparsely, minutely punctate, obsoletely foveate in the middle between the eyes, the latter large, distant; antennae slender, rather short, joint 11 nearly equalling 8–10 united. Prothorax a little longer than broad, oblongo-cordate, dilated at the base, the basal margin feebly raised; sparsely, minutely punctate. Elytra elongate, twice as broad as the prothorax, gradually widened to beyond the middle, and somewhat acuminate posteriorly; closely, finely punctato-striate, the interstices becoming convex towards the tip, 3 and 5 with from six to eight setigerous impressions scattered between the base and apex, 1, 7, and 9 also with from one to three similar impressions on the apical half.

♂. Rufo-testaceous, the elytra with a distinct aeneous lustre, the green marginal stripe wanting; antennae much longer, joint 11 very elongate, nearly equalling 7–10 united; alternate elytral interstices with fewer setigerous impressions—five on 3, and two on 5, those on 1 and 7 wanting.

Length 8, breadth $2\frac{2}{5}$–$2\frac{1}{2}$ mm.

Hab. BRAZIL [type], Parana (*ex coll. Fry* : ♂).

Two specimens, almost certainly the sexes of the same species, the Parana male differing as stated above. Very near the Colombian *S. lateralis*, Mäkl., but with a much narrower head and prothorax, the latter very sparsely, minutely punctate, the elytra with scattered setigerous impressions, along the interstices 3 and 5, the marginal stripe (when present) extending to the apex, the apical joint of the antennae (♀) shorter. A similar variation is common to other members of the genus.

73. **Statira aeneomarginata,** n. sp.

♀. Elongate, depressed, shining, the head and prothorax subopaque; testaceous, the eyes black, the head and prothorax rufescent, the sides of the elytra indeterminately aeneo-piceous from the base to far beyond the middle, the elytra with a few bristly hairs. Head densely scabroso-punctulate, the eyes small, distant; antennae short, slender, joint 11 equalling 8–10 united. Prothorax a little narrower than the head, longer than broad, moderately rounded at the sides, feebly constricted towards the base, the basal margin not raised; densely scabroso-punctulate. Elytra long, at the base twice as wide as the prothorax, widening to the middle, somewhat acuminate posteriorly; closely, finely, shallowly punctato-striate, the interstices flat throughout, 3 with four small setigerous impressions scattered along the apical half, 5 also with two other impressions, and 7 with one, towards the tip. Legs slender.

Length $7\frac{1}{2}$, breadth $2\frac{1}{2}$ mm.

Hab. BRAZIL, Rio de Janeiro (*Fry*).

One specimen. A small pallid insect, not unlike the Colombian *S. lateralis*, Mäkl., and the Brazilian *S. suffusa*; but with a dull, scabrous head and prothorax, shining, aeneo-marginate elytra, the latter with the interstices flat throughout.

74. **Statira trachydera,** n. sp.

Very elongate, narrow, feebly shining; piceous, the front of the head, elytral suture, tarsi, bases of femora, and under surface castaneous or ferruginous; the elytra with scattered bristly hairs. Head rather small, closely, coarsely punctate, longitudinally impressed between the eyes, the latter large, narrowly separated; antennae moderately thickened, rather long, joint 11 equalling 8–10 united. Prothorax a little wider than the head, longer than broad, rounded at the sides, constricted before the raised basal margin; coarsely, irregularly, confluently punctate. Elytra very elongate, at the middle about twice as wide as the prothorax, somewhat acuminate posteriorly; closely, finely, deeply punctato-striate, the interstices convex, flatter on the disc, 3 and 5 with a series of small setigerous impressions scattered throughout their length, 9 also with three impressions near the apex, and 1 with several others near the base. Tibiae pilose within.

Length 11, breadth $3\frac{1}{5}$ mm. (♀?)

Hab. BRAZIL, Jatahy, Prov. of Goyas (*Pujol, ex coll. F. Bates*).

One specimen. This insect is of about the same size and build as *S. purpureipennis*, Pic, from the same locality, differing from it in the small, closely punctured, subsulcate head, the coarsely, confluently punctate prothorax, and the non-tuberculate elytra, the elytra with fewer, differently-arranged setigerous impressions, those on the interstices 1 and 7 mostly wanting.

75. **Statira scabricollis,** n. sp.

♀. Elongate, dull, the elytra more shining; piceous, the elytra brown, the antennae (joint 1 excepted) and legs (the infuscate outer halves of the femora excepted) testaceous; the head, elytra, and under surface with a few long, erect, bristly hairs. Head barely as wide as the prothorax, densely, minutely punctate, hollowed between the eyes anteriorly, the latter large, narrowly separated; antennae moderately long, quite slender, joint 11 equalling 7–10 united. Prothorax slightly longer than broad, oblongo-cordate, constricted before the prominent, laterally-projecting basal margin; densely, minutely, scabroso-punctate, the disc with two small transversely-placed foveae before the middle (? accidental). Elytra long, twice as wide as the prothorax, widening in their basal half, acuminate posteriorly; closely, finely, deeply punctato-striate, the interstices convex throughout, 3, 5, and 9 with several small setigerous impressions scattered between the base and apex. Femora rather stout.

Length $8\frac{4}{5}$, breadth 3 mm.

Hab. Upper Amazons, Ega (*H. W. Bates*).

One female. A close ally of *S. insularis* (No. 77), from Trinidad, with the elytra more acuminate at the apex, deeply punctato-striate, and the interstices convex throughout; and the femora nigro-piceous in their outer halves. The eleventh antennal joint is no doubt equally elongate in ♂, to judge from its length in ♀. The Brazilian *S. flavicornis*, Mäkl., is probably another allied form.

76. **Statira convexiuscula,** n. sp.

♀. Elongate, rather convex, shining; testaceous, the head and prothorax rufescent, the eyes, palpi, femora (except at the base), and tibiae black or piceous, the elytra with a few bristly hairs. Head rather small, not quite so wide as the prothorax, densely, very finely punctate, obsoletely foveolate between the eyes, the latter moderately large, distant; antennae short, slender, joint 11 nearly equalling 8–10 united. Prothorax oblongo-cordate, constricted before the base, the basal margin raised, but not very prominent laterally; almost smooth, except within the transverse basal groove, which is shallow in the centre. Elytra moderately elongate, about twice as wide as the prothorax, narrowing from the middle; closely, finely, rather deeply punctato-striate, the interstices feebly convex, 3 and 5 with three or four inconspicuous, setigerous punctures scattered down the apical half, and 9 with three others near the apex. Legs rather short, the anterior femora clavate.

Length $8\frac{1}{5}$, breadth $2\frac{1}{2}$ mm.

Hab. BRAZIL, Bahia (*Reed*).

One female. Not unlike *S. scabricollis* (♀), from Ega, but in great part testaceous and more shining, the eyes smaller and more distant, the antennae shorter, the prothorax almost smooth, the tibiae and the basal halves of the femora black. *S. melanocephala*, Mäkl., from Central America, is a somewhat similar insect, except that it has the head and antennae infuscate or black.

77. **Statira insularis,** n. sp.

Elongate, the head and prothorax subopaque, the elytra shining; testaceous, the head and prothorax obscure ferruginous, the eyes black; the elytra with a few long, bristly hairs. Head rather small, closely, minutely punctate, longitudinally depressed down the middle between the eyes, the latter extremely large and narrowly separated in the two sexes; antennae long and slender, shorter in ♀, joint 11 in ♂ as long as 6–10, in ♀ the length of 8–10, united. Prothorax as wide as (♂) or rather wider than (♀) the head, about as broad as long, feebly rounded at the sides, strongly constricted before the base, the basal margin prominent and laterally projecting; alutaceous and closely, very minutely punctate. Elytra long, at the middle twice as broad as the prothorax, somewhat rapidly widened in their basal half, and acuminate posteriorly; closely, finely, deeply punctato-striate, the interstices becoming convex towards the sides and apex, 3, 5, and 9 each with from three to six widely scattered setigerous impressions.

Length 8–8¾, breadth 2½–2¾ mm. (♂♀.)

Hab. TRINIDAD (*G. E. Bryant*, iii. 1903; *F. Birch*, 1904).

Three males and one female. Very like the Antillean *S. fulva*, but with a long apical joint to the antennae, especially in ♂, a comparatively small head, extremely large, subapproximate eyes, and rather convex, mesially widened, posteriorly acuminate elytra. *S. tolensis*, Champ., from Panama, is not unlike *S. insularis*, but the latter has the elytra less elongate, etc. Mr. Bryant's specimens have been examined by M. Pic and returned unnamed.

78. **Statira fulva.**

Statira fulva, Fleut. et Sallé, Ann. Soc. Ent. Fr. 1889, p. 431.[14]

[14] A species omitted from my Supplementary Catalogue of Lagriidae (1898) and also from that of Borchmann (1910).

Elongate, somewhat depressed, the head and prothorax opaque, the elytra shining; testaceous, the head and prothorax obscure ferruginous, the eyes black; the elytra with a few long, erect, bristly hairs. Head obsoletely punctulate, the eyes large and well separated; antennae long, slender, joint 11 about as long as 9 and 10 united in the two sexes. Prothorax as wide as the head, oblongo-cordate, dilated at the base, densely alutaceous, the minute scattered punctures just traceable. Elytra long, widened to the middle and there twice as wide as the prothorax, acuminate posteriorly; closely, finely, deeply punctato-striate, the interstices rather convex, 3 and 5 with several widely scattered setigerous impressions, 1, 7, and 9 also with one or two similar impressions towards the apex.

Length $7\frac{1}{2}$–$10\frac{1}{2}$, breadth $2\frac{1}{2}$–3 mm. (♂♀.)

Hab. ANTILLES, Guadeloupe [type], Dominica (*Mus. Brit.*).

Two specimens from Dominica, one of them received from Mr. E. F. Becher in 1908, are no doubt referable to the imperfectly-described *S. fulva* from Guadeloupe. In the Museum there is also another example, without locality, from the Dejean collection, apparently belonging to the same species; it is labelled "*S. humeralis*[15] var.? (Dupont)." *S. fulva* is a form of *S. vittata*, Champ., from the Lesser Antilles and Trinidad, with a densely alutaceous, opaque prothorax, and slightly longer, wholly testaceous elytra. It has been found "at light" in both islands.

79. **Statira vittata.**

Statira vittata, Champ., Trans. Ent. Soc. Lond. 1896, p. 37, pl. 1, fig. 9 (♂).

Hab. LESSER ANTILLES; TRINIDAD.

In the British Museum there is a series of this insect captured long ago in St. Vincent by Lansdown Guilding, also two from Trinidad, in Fry's collection.

80. **Statira asperata.**

Statira asperata, Champ., Biol. Centr.-Am., Coleopt. iv, 2, p. 49, pl. 3, fig. 4 (♂) (1889).

Statira antillarum, Champ., Trans. Ent. Soc. Lond. 1896, p. 36.

Hab. PANAMA; LESSER ANTILLES, St. Vincent, Grenada,

[15] Nec *S. humeralis*, Mäkl., a Mexican insect.

Grenadines; COLOMBIA; VENEZUELA; TRINIDAD (*G. E. Bryant*); BRAZIL, Pernambuco (*Fry*).

The long series before me connect the Antillean with the mainland form, Panama examples having conspicuous tubercles on the alternate elytral interstices 1, 3, 5, 7 and 9. One of the Pernambuco specimens is rufo-castaneous with the elytra piceous, and another is rufo-castaneous with the sides of the elytra broadly piceous.

81. **Statira presuturalis.** (Plate XII, fig. 18, ♀.)

Statira presuturalis, Pic, L'Échange, xxviii, p. 76 (Oct. 1912).

Antennae not longer in ♂ than in ♀, rather stout, joint 11 equalling 9 and 10 united in the two sexes; head with a large shallow interocular fovea; prothorax slightly longer than broad, very finely, sparsely punctate; elytra depressed below the base, very finely, closely striato-punctate, the punctures usually placed in fine striae on the basal half, the interstice 3 with several, and 5 and 9 with one or two, widely separated setigerous impressions on the apical half; body rather convex, castaneous, shining, the palpi and prothorax sometimes infuscate, the juxta-sutural blackish stripe on the elytra often continued to the apex, dilated beyond the middle into a complete or interrupted transverse fascia, and widened again at the apex; femora strongly clavate; aedeagus of ♂ rather broad and acuminate. Femora more or less clavate.

Length 5½–8½, breadth 2–3 mm. (♂♀.)

Hab. BRAZIL (*Mus. Brit.*, *Mus. Oxon.*), Blumenau (*coll. Pic*: type), Rio de Janeiro (*Fry*).

The long series of this insect before me agree sufficiently well with Pic's brief diagnosis to render the identification certain. From the somewhat similar *S. suturalis*, Mäkl. (No. 5), from Rio de Janeiro, etc., it is at once separable by the absence of the long spine at the base of the anterior femora, the stouter antennae, with shorter apical joint in ♂, the longer prothorax, etc. The juxta-sutural stripe is often dilated into a post-median fascia and an apical patch.

82. **Statira octolineata,** n. sp.

Somewhat robust, moderately elongate, shining; obscure castaneous, the legs and antennae ferruginous in one specimen, the alternate elytral interstices 2, 4, 6, 8 each with a narrow blackish stripe extending to near the apex; the elytra with a few, erect, bristly hairs. Head almost smooth, excavate or foveate in the middle between the eyes, the latter moderately large and separated by about the width of one of them; antennae rather slender, moderately long, a little shorter in ♀, joint 11 as long as 9 and 10 united. Prothorax as wide as the head, as long as broad, oblong-cordate, dilated at the base, very sparsely, minutely punctulate. Elytra moderately long, broad, twice as wide as the prothorax at the base, flattened on the disc anteriorly, slightly widening to the middle and acuminate posteriorly, the apices distinctly mucronate; closely, finely punctato-striate, the interstices becoming feebly convex towards the apex, 3 and 5 each with about five very widely scattered setigerous impressions, 9 also with two or three similar impressions towards the tip. Femora more or less clavate.

Var. The elytra uniformly castaneous, the setigerous impressions wanting on the basal half of the third interstice. (♂.)

Length $8\frac{4}{5}$–$9\frac{1}{2}$, breadth $2\frac{1}{2}$–$2\frac{4}{5}$ mm.

Hab. Brazil, Rio de Janeiro (*Fry*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857).

Two specimens of the lineate form, assumed to be ♂ and ♀, one of them having longer antennae than the other, and one of the variety. More elongate than *S. presuturalis*, Pic, the head and prothorax a little broader, the elytra longer, more acuminate at the tip, and with the alternate interstices nigro-lineate to near the apex.

83. Statira trilineata.

Statira trilineata, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 357 (1878).

♂. Antennae rather short and stout, joints 4–10 decreasing in length, 9 and 10 transverse, 11 very elongate, as long as 6–10 united; head deeply foveate in the middle between the eyes; the elytra with an elongate intra-humeral depression, the scattered setigerous impressions along the entire length of the alternate interstices 1, 3, 5, 7, and 9 each preceded by a small tubercle; femora more or less clavate.

Hab. Colombia (*Mus. Helsingfors*: type; *Mus. Brit.*).

A male in the British Museum, from the F. Bates collection, is almost certainly referable to this species. It differs from the description in having the numerous setigerous impressions along the alternate elytral interstices deeply impressed and each preceded by a small, tumid, tuberculiform space. There is considerable variation in this respect in the allied *S. asperata*, Champ. *S. trilineata* is of a bright rufo-castaneous colour, with a blackish line along the elytral suture and another down the fifth interstice. *S. presuturalis*, Pic, is a very similar form.

84. **Statira tenuis,** n. sp.

Moderately elongate, narrow, shining; castaneous or obscure castaneous, the antennae in the male piceous with the apical joint ferruginous; the elytra with a few very long, erect, bristly hairs. Head rather small, rounded, almost smooth, the eyes very large and narrowly separated; antennae (♂) slender, long, joints 7–10 decreasing in length, 11 extremely elongate, about equalling 3–10 united, (♀) shorter and stouter, 11 barely the length of 7–10 united. Prothorax about as wide as the head, longer than broad, oblong, moderately constricted before the base, sparsely, minutely punctate. Elytra about twice as broad as the prothorax, moderately long, but little widened towards the middle and acuminate posteriorly; very finely, closely, striato-punctate, the interstices flat, 3 with about six prominent setigerous impressions scattered between the base and apex, and 5 and 9 each with three or four similar impressions on the apical half.

Length $5\frac{4}{5}$–$7\frac{4}{5}$, breadth $1\frac{4}{5}$–$2\frac{1}{10}$ mm.

Hab. Amazons, Ega [type], Santarem (*H. W. Bates*).

Two males and one female. Not unlike the Brazilian *S. stenodera*, but with an extremely elongate apical joint to the ♂-antennae, large, subcontiguous eyes, and much narrower elytra, with flat interstices. The general shape is similar to that of the Colombian *S. trilineata*, Mäkl., as here interpreted.

85. **Statira stenodera,** n. sp.

Moderately elongate, shining; rufo-castaneous or castaneous, or piceo-castaneous with the antennae and legs in great part reddish, the elytra often faintly streaked with piceous on the alternate interstices; the head and elytra with a few long, erect, bristly hairs. Head sparsely, very finely punctate, well developed behind the eyes, and with a large, shallow, punctured fovea between them, the eyes rather small (as seen from above) and distant; antennae slender, joint 11 the length of 9 and 10 united in the two sexes. Prothorax slightly longer than broad, nearly as wide as the head, oblong, moderately constricted before the base; sparsely, minutely punctate. Elytra not very elongate, at the base twice as broad as the prothorax, gradually widened to the middle and rapidly narrowed posteriorly, mucronate at the tip, transversely depressed on the disc anteriorly; closely, finely punctato-striate, the interstices feebly convex, 3, 5, and 9 with from two to four widely scattered setigerous impressions. Anterior femora clavate.

Length 6–6¾, breadth 2–2½ mm. (♂♀.)

Hab. Brazil (*Mus. Brit.*, *Mus. Oxon.*), Constancia, Tijuca (*J. Gray* and *H. Clark*, Jan. 1857), Rio de Janeiro (*Fry*), Sao Antonio, Bahia (*Gounelle*).

A long series, those in the Oxford Museum in very bad condition, some of them (immature) obscure testaceous in colour. Separable from the closely allied *S. presuturalis*, Pic, by the relatively narrower head and prothorax, the smaller eyes, the more slender antennae, etc.; from *S. octolineata* by the much shorter elytra, narrower head and prothorax, and smaller eyes; and from *S. suturalis*, Mäkl., by the absence of the anterior femoral spine, etc. This is one of several members of the genus with the eleventh antennal joint similar in length in the two sexes.

86. **Statira egaensis**, n. sp.

Moderately elongate, widened posteriorly, shining; rufo- or fusco-castaneous, the eyes black, the elytra and legs (the knees and bases of the femora excepted) nigro-piceous or piceous, in one specimen almost concolorous with the rest of the surface; the elytra with numerous long bristly hairs. Head broad, well-developed behind the eyes, sparsely, finely punctate, the eyes moderately large, distant; antennae slender, comparatively short, joint 11 equalling 9 and 10 united. Prothorax as wide as the head, broader than long, transversely cordate, constricted in front of the prominent hind angles, the basal margin not much raised; sparsely, finely, conspicuously punctate. Elytra not very elongate, in their widest part more than twice the breadth of the prothorax, rapidly dilated to the middle, and arcuately narrowed thence to the apex; somewhat coarsely, closely, crenato-striate, the punctures on the disc transverse, the interstices more or less convex, 1, 3, 5, 7, and 9 each a row of rather closely placed setigerous impressions extending from the base to the apex. Anterior femora strongly clavate.

Length 6½–7, breadth 2¼–2¾ mm. (♀?)

Hab. Upper Amazons, Ega (*H. W. Bates*).

Three specimens, varying in the colour of the elytra and legs, as is frequently the case in this genus. *S. egaensis* resembles *S. stenodera* in its general facies; but the head and prothorax are much broader, the prothorax is transverse, and the alternate elytral interstices have each a row of setigerous impressions extending throughout their length, much as in the Central American *S. microps*, Champ.

87. **Statira elegans.** (Plate XII, fig. 19, anterior leg, ♂.)

Statira elegans, Mäkl., Act. Soc. Fenn. vii, p. 156 (1862).
Var. *Statira festiva*, Mäkl., loc. cit.

Antennae in ♂ with joint 11 about as long as 7–10, in ♀ as long as 8–10, united; anterior femora clavate; anterior tibiae abruptly narrowed and compressed at the base externally, subangulate at basal third in ♂.

Hab. Brazil, Petropolis (*J. Gray* and *H. Clark*, Feb. 1857), Rio de Janeiro, San Paulo, Espirito Santo (*Mus. Brit.*).

A dozen specimens before me from the above-mentioned localities agree with Mäklin's description of *S. elegans*, except that they have the prothorax very finely alutaceous (thus appearing subopaque), instead of shining, as stated by him; but this is probably an error of observation. A rather narrow, moderately elongate form, with the head (the eyes excepted), antennae, prothorax and legs testaceous or rufo-testaceous, the elytra uniformly green or bluish-green, and the metasternum and abdomen black; the antennae slender; the eyes large, the space between them longitudinally impressed in the middle; the prothorax strongly constricted before the base, canaliculate on the disc, and almost impunctate; the elytra closely, finely punctato-striate, with seven or eight setigerous impressions scattered along the third interstice and one or two others at the apex of the ninth; the anterior tibiae compressed at the base. *S. festiva*, to judge from the description, is a variety of *S. elegans* with the head (except in front) and prothorax piceous. The head in one of the specimens before me is infuscate, but not the prothorax. These insects might easily be mistaken for similarly-coloured Carabids.

88. **Statira distigma,** n. sp. (Plate XII, fig. 20, prothorax, ♂.)

♂. Moderately elongate, narrow, shining; testaceous, the eyes and abdomen black, the elytra metallic blue, the apical joint of the antennae and the posterior femora (except at the base) and tibiae slightly infuscate; the elytra with a few long, erect, bristly hairs.

Head rather large, sparsely, shallowly subfoveolate between the eyes, the latter large and somewhat distant; antennae slender, joints 8–10 decreasing in length, 11 as long as 7–10 united. Prothorax narrower than the head, about as long as broad, oblongo-cordate, strongly constricted before the base; sparsely, minutely punctate, obsoletely canaliculate at the middle of the disc, and with a large, subtriangular, rugose, depressed area on each side (fig. 20). Elytra moderately long, at the middle about twice as wide as the prothorax, rounded at the apex, longitudinally depressed within the humeri; very finely, closely punctato-striate, the third interstice with six widely scattered setigerous impressions, the ninth also with two others near the tip. Legs long; anterior tibiae rounded externally at the base.

Length $7\frac{1}{5}$, breadth $2\frac{1}{2}$ mm.

Hab. Peru, Chanchamayo (*ex coll. F. Bates*).

One male, probably collected by Thamm. Very like the Brazilian *S. elegans*, Mäkl., and similarly coloured; but with the prothorax more shining, distinctly punctured, and with a large, subtriangular, rugose, depressed area on each side of the disc (somewhat as in the Central American *S. foveicollis*, Champ., ♂, and possibly confined to that sex), the posterior femora and tibiae partly infuscate, the anterior tibiae not compressed at the base.

89. **Statira cyanoptera**, n. sp.

♂. Elongate, narrow, depressed, slender, opaque, the elytra and the front of the head somewhat shining; black, the elytra cyaneous, the palpi at the base, joints 4–11 of the antennae, the tarsi, and in one specimen the legs entirely, testaceous; the elytra with a few long, erect, bristly hairs. Head rather narrow, sparsely, finely punctate, shallowly sulcate between the eyes, the latter large, separated by about half the width of one of them; antennae long, slender, joint 11 extremely elongate, equalling 6–10 united. Prothorax nearly as wide as the head, much longer than broad, oblongo-cordate, feebly dilated at the base, smooth, the basal margin not raised. Elytra moderately elongate, twice as broad as the prothorax, somewhat acuminate posteriorly; closely, finely punctato-striate, the punctures transverse on the disc, the interstices feebly convex, 3 with five or six, and 5 with three, widely scattered setigerous impressions, 1 and 9 also with one or two near or before the tip. Legs long and slender.

Length $6\frac{1}{10}$–$7\frac{1}{10}$, breadth 2–$2\frac{1}{10}$ mm.

Hab. Brazil (*Mus. Brit.*: type), Rio de Janeiro (*Fry*).

Two examples, one with the tarsi only, the other (from Rio de Janeiro) with the legs entirely, testaceous, showing that no reliance can be placed on the colour of the legs as a specific character. A narrow black insect, with the elytra blue and slightly shining, the prothorax long, smooth, and opaque, the antennae and legs long and slender, the antennae testaceous, with joints 1–3 blackened.

90. **Statira casnonioides,** n. sp. (Plate XII, fig. 21, ♂.)

Moderately elongate, narrow, depressed, rather dull, the elytra shining; piceous, the head black in one specimen the femora and tibiae sometimes paler than the body, the antennae (joint 1 excepted) and tarsi testaceous; the head and elytra with very long, erect, scattered bristly hairs. Head large, broad, sparsely, finely punctate, in two specimens, longitudinally depressed between the eyes, the latter large and moderately distant in ♂, a little smaller in ♀; antennae slender, moderately long, joint 11 in ♂ about as long as 7–10, in ♀ not quite equalling 8–10, united. Prothorax narrow, longer than broad, oblong-campanulate, sparsely, minutely punctate, the interspaces alutaceous, the basal margin prominent. Elytra moderately long, at the base, twice as wide as the prothorax, subparallel in their basal half in ♂, with a very deep, oblique depression on the disc below the base; shallowly, minutely striato-punctate, the interstices flat, 3 with about five, and 5 and 9 with three or four, widely scattered conspicuous setigerous impressions, 1 also with a single impression near the tip, the impressions each preceded by a minute tubercle. Legs slender, long; anterior tibiae in both sexes abruptly narrowed at the base externally.

Length $6\frac{1}{10}$–$7\frac{1}{2}$, breadth $1\frac{3}{4}$–$2\frac{1}{3}$ mm. (♂♀.)

Hab. Brazil (*Mus. Oxon.*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857: type, ♂), Rio de Janeiro (*Fry*: ♀).

Five specimens, the one in the Oxford Museum immature and almost wholly testaceous. Near *S. dromioides*, infra, from which it differs in having a narrower and smoother prothorax, a shorter apical joint to the ♂-antennae, deeply excavate elytra, with fewer setigerous impressions, and peculiarly formed anterior tibiae, the body also being uniformly piceous. The large head and narrow prothorax give the insect a Casnoniiform facies. *S. elegans*, Mäkl., has somewhat similar anterior tibiae in the two sexes.

91. **Statira campanulata,** n. sp.

Elongate, narrow, dull; piceous, the antennae (joints 1 and 2 excepted) obscure ferruginous, the elytra with scattered long, erect, black bristly hairs. Head large, broad, closely punctate, longitudinally grooved between the eyes, the latter large and narrowly separated; antennae short, rather slender, joint 11 about equalling 7–10 united. Prothorax narrower than the head, longer than broad, campanulate, closely, somewhat coarsely punctate, the basal margin very prominent. Elytra moderately long, about twice as broad as the prothorax, subparallel at the base; closely, finely punctato-striate, the interstices with numerous setigerous impressions, each of them preceded by a small tubercle—three near the apex of 1, ten scattered between the base and apex of 3, five or six on 5, and eight on 9, those on 5 and 9 placed along the apical half. Legs moderately slender, roughly punctured and setulose, the tibiae shallowly sulcate externally.

Length $8\frac{1}{2}$, breadth $2\frac{2}{5}$ mm. (♂?)

Hab. Upper Amazons, Ega (*H. W. Bates*).

One badly preserved example. Larger than *S. dromioides*, wholly piceous, the eyes more approximate, the apical antennal joint shorter, the prothorax longer and more coarsely punctate, the legs roughly punctured. The setigerous impressions on the elytra are similar in number and position in the two insects.

92. **Statira dromioides,** n. sp.

♂. Elongate, narrow, depressed, moderately shining; testaceous, the eyes black, the elytra piceous; the head and elytra with a few very long, erect, bristly hairs, one behind each eye being conspicuous. Head large, broad, rather convex, sparsely punctate, longitudinally grooved between the eyes, the latter very large, moderately distant; antennae rather long, slender, joints 4–10 gradually decreasing in length, 11 extremely elongate, equalling six or seven of the preceding joints united. Prothorax much narrower than the head, a little longer than broad, oblong-campanulate, closely, conspicuously punctate, the interspaces alutaceous, the basal margin sharply raised. Elytra moderately elongate, twice as broad as the prothorax, not much wider at the middle than at the base, narrowly rounded at the tip; very finely punctato-striate, the interstices alutaceous, almost flat, 3 with about 7 setigerous impressions scattered between the base and apex, 5 and 9 also with four similar impressions along their apical half, and 1 with two or three near the tip, each of them preceded by a small tubercle. Legs long and slender.

Length 6–7, breadth 2 mm.

Hab. BRAZIL, Ceara (*Gounelle, ex coll. Fry*).

Two males. A narrow, moderately shining, testaceous form, with piceous, sparsely seriato-tuberculate elytra, a very broad head, a conspicuously punctured, subcampanulate prothorax, and an extremely elongate apical joint to the ♂-antenna. *S. dromioides* is very like various similarly coloured species of the Carabid-genus *Dromius*.

93. **Statira stenoptera,** n. sp.

Elongate, narrow, the head and prothorax dull, the elytra shining; testaceous or obscure testaceous, the eyes black, the sides of the elytra broadly and indeterminately, the prothorax, and the posterior femora in their outer half, more or less infuscate; the elytra with a few very long bristly hairs. Head large, transversely convex, much broader than the prothorax, closely punctate, the eyes large, narrowly separated in ♂, more distant in ♀; antennae slender [outer joints missing]. Prothorax much longer than broad, oblong-campanulate, constricted before the base, the basal margin raised; somewhat closely, conspicuously punctate, the interspaces alutaceous. Elytra long, narrow, slightly widened at the middle and there twice as wide as the prothorax, somewhat acuminate posteriorly, deeply, obliquely depressed on the disc below the base, and also longitudinally hollowed towards the sides just below this; closely, finely punctato-striate, the interstices almost flat, 3 with five or six setigerous impressions scattered between the base and apex, and 1 and 5 with one or two, and 9 with three, similar impressions towards the tip.

Length 6–6$\frac{2}{5}$, breadth 1$\frac{1}{5}$ mm.

Hab. AMAZONS, Ega, Santarem (*H. W. Bates*).

Two specimens, assumed to be ♂ and ♀. A narrow, fragile form, with a large head, allied to *S. dromioides* and *S. casnonioides*, the head and prothorax punctured as in the former, and the elytra deeply excavate below the base as in the latter; the prothorax is long and narrow, as in *S. dromioides*.

94. **Statira quadrisignata,** n. sp.

♂. Elongate, narrow, shining, the elytra dull; testaceous, the eyes and two broad transverse fasciae on the elytra (one basal, narrowed outwards, the second broader, post-median, straight, neither reaching the suture or outer margin) black; the elytra with scattered long, erect, bristly hairs. Head sparsely, very minutely punctate, canaliculate between the eyes, the latter very large and narrowly separated; antennae moderately slender, joint 11 as long as 8–10 united. Prothorax longer than broad, almost as wide as the head, subcordate, dilated at the base, sparsely, very minutely punctate. Elytra long, rather narrow, rapidly narrowed from the middle, and pointed at the apex; closely, finely, shallowly punctato-striate, the alternate interstices 1, 3, 5, 7, and 9 with a series of scattered, deep, setigerous impressions extending from the base to the apex, the impressions each preceded by a small tubercle.

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

Hab. AMAZONS, Santarem (*H. W. Bates*).

One male. Not unlike *S. bryanti*, Pic, from Trinidad, but with the elytral sculpture similar to that of the widely distributed *S. asperata*, Champ.; the elytra longer and more acuminate than in the Trinidad insect, and very differently marked, the two broad black fasciae (basal and post-median) not reaching the suture and thus forming two large transverse patches on each wing-case.

95. **Statira bryanti.** (Plate XII, fig. 22, ♂.)

Statira bryanti, Pic, L'Echange, xxviii, p. 100 (Jan. 1913).

Antennal joint 11 in ♂ about as long as 7–10, in ♀ equalling 8–10, united.

Hab. TRINIDAD (*G. E. Bryant*: iii. 1903).

There are two males and three females of this species in Mr. Bryant's collection. A narrow, testaceous form allied to the Central American *S. conspicillata*, Mäkl., the prothorax with a black submarginal line on each side of the prothorax, and the elytra with two transverse fasciae (one just below the base, broad, the other narrower, curved, median), usually connected along the first interstice, and an oblong streak on the disc towards the apex (in one specimen extending forward to the median fascia), blackish or metallic. The elytra are closely, finely punctato-striate to the tip, the third and ninth interstices each with from 2–4 scattered setigerous impressions on the apical third. The prothorax is rather closely, minutely punctate and more or less distinctly canaliculate. The description of the similarly coloured *S. quadrimaculata*, Mäkl., from Colombia, applies very nearly to the Trinidad insect, except that the prothorax in the former is said to be almost impunctate and the fine median channel is not mentioned.

96. **Statira viridicincta**, n. sp.

Moderately elongate, narrow, shining; testaceous, the eyes black, the prothorax with a nigro-fuscous submarginal vitta on each side (abbreviated or wanting in immature examples); the elytra with two transverse metallic green fasciae of variable extent—one basal, not reaching the humeri, and sometimes enclosing an oblique testaceous spot on the disc, the other median, angulate, the two sometimes connected along the suture, and in two specimens at the sides also; the elytra with a few long, erect, bristly hairs. Head sparsely, minutely punctate, tranversely depressed in the middle between the eyes, the latter large, distant; antennae long, slender, joint 11 in ♂ about as long as 7–10, in ♀ as long as 8–10, united. Prothorax narrower than the head in ♂, slightly wider in ♀, not longer than broad, cordate, dilated at the base, sparsely, minutely punctate. Elytra moderately long, gradually widened to the middle and there twice as wide as the prothorax; closely, finely, deeply punctato-striate, the interstices somewhat convex, 3 with from six to eight conspicuous setigerous impressions scattered between the base and apex, 9 also with three similar impressions towards the tip.

Length $5\frac{1}{2}$–$6\frac{1}{2}$, breadth 2–$2\frac{1}{5}$ mm. (♂♀.)

Hab. AMAZONS, Santarem, Ega (*H. W. Bates*), Para (*Gounelle*).

Nine specimens, varying in the development of the prothoracic and elytral markings, and in the puncturing of the prothorax. The metallic coloration on the elytra in the Para example is so extended as to leave two oblique fasciae on the disc of each of them, and a common apical patch, testaceous. It is quite possible that these insects will prove to be inseparable from the Colombian *S. quadrimaculata*, Mäkl., which, to judge from the description, has a longer, almost impunctate prothorax, fewer setigerous impressions on the third elytral interstice (and those placed towards the apex), and a dark ante-apical spot. *S. bryanti*, Pic, from Trinidad, which is similarly coloured, has shorter antennae, a longer and distinctly canaliculate prothorax, and fewer setigerous impressions on the elytra. *S. viridinotata*, Pic, from Cumbase, Peru, must be another allied form.

97. **Statira connexa,** n. sp. (Plate XIII, fig. 23, ♂.)

Rather short, narrow, somewhat convex, shining, glabrous; testaceous, the eyes and the base of the antennae, and the elytra with two transverse fasciae (one close to the base, the other submedian, connected along the suture), and in one example (♂) a common, transverse, subapical patch at the termination of the narrow sutural streak, black or fuscous. Head large, broad, sparsely, obsoletely punctulate, flattened between the eyes, the latter large and moderately distant; antennae (♂) elongate, slender, joint 11 as long as 9 and 10 united, (♀) much shorter, joint 11 less elongate. Prothorax longer than broad, oblongo-subcordate, the basal constriction moderately deep; closely, finely punctate. Elytra rather short, twice as wide as the prothorax, subparallel in their basal half in ♂, dilated posteriorly in ♀, transversely depressed below the base; closely, somewhat deeply punctato-striate, the punctures rather coarse on the basal half, fine on the apical declivity, the interstices convex towards the sides and apex. Femora strongly clavate.

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

Hab. Amazons, Santarem [♂, type], Ega [♀] (*H. W. Bates*).

One pair, the male with the elytral markings more developed than in the female. A small, comparatively short form, not unlike an *Anthicus*, with the elytra fasciate much as in *S. viridicincta* from the same Amazonian localities, and *S. bryanti*, Pic, from Trinidad. *S. connexa* would perhaps be better placed in the genus *Colparthrum*; but till the structure of the mandibles, etc. has been examined, the insect is better left under *Statira*. The apical joint of the labial palpi is securiform and rather small; the femora abruptly clavate.

98. **Statira viridifasciata,** n. sp.

Elongate, narrow, shining; testaceous, the eyes black, the elytra with two broad, transverse, metallic green fasciae—one basal, not including the humeri, the other post-median, the two connected along the suture, the second extending a short distance down the first interstice posteriorly; the elytra with a few long, erect, bristly hairs towards the apex. Head almost smooth, with a shallow, transverse, sparsely punctate fovea between the eyes, the latter very large; antennae long and slender, joint 11 as long as 7–10 united. Prothorax longer than broad, oblongo-cordate, strongly constricted before the dilated base; closely, finely punctate. Elytra long, parallel in their basal half; closely, finely, deeply punctato-striate, the interstices convex beyond the middle, 3 with four deep setigerous impressions scattered along the apical half, 1 with one and 9 with two similar impressions near the tip. Legs long; anterior femora strongly clavate; anterior tibiae rounded externally at the base.

Length $9\frac{1}{4}$, breadth $2\frac{1}{4}$ mm. (♂ ?)

Hab. Upper Amazons, Ega (*H. W. Bates*).

One specimen. A close ally of *S. calophaenoides*, infra, with the broad elytral fasciae green and connected along the suture, the setigerous impressions deep and very few in number, four only being present on the third interstice. The elytra are parallel, not widened towards the middle. *S. viridinotata*, Pic (Mélanges exot.-entom. iv, p. 15), from Cumbase, Peru, must be very similar; but as nothing is said about the testaceous humeral patch, and it apparently has more numerous setae on the elytra, the identification cannot be accepted without an examination of the type.

99. **Statira elegantula,** n. sp. (Plate XIII, fig. 24, ♂.)

♂. Moderately elongate, narrow, depressed, shining; testaceous, the eyes black, the elytra, except the basal margin, an ante-median transverse fascia (widened outwards and not reaching the suture), and the apex, metallic green or bluish green; the elytra with a few, long, erect, bristly hairs. Head almost smooth, with a shallow, transverse, punctured depression between the eyes, the latter moderately large; antennae long and slender, joints 7–10 decreasing in length, 11 extremely elongate, about as long as 4–10 united. Prothorax narrower than the head, longer than broad, oblongo-cordate, dilated at the base; sparsely, minutely punctate, in one specimen obsoletely canaliculate on the disc anteriorly. Elytra moderately long, subparallel in their basal half, nearly twice as broad as the prothorax; closely, finely, deeply punctato-striate, the interstices convex, 3 with four or five widely scattered setigerous impressions, and 9 with two similar impressions at the base. Legs long, slender; anterior femora stout, clavate; anterior tibiae obliquely narrowed externally at the base.

Length $5\frac{1}{2}$–$6\frac{1}{2}$, breadth $1\frac{1}{2}$–2 mm.

Hab. Amazons, Ega and Para (*H. W. Bates*).

Three specimens, showing no variation. Smaller and more slender than *S. viridifasciata*; the elytra less elongate, and with the green coloration more extended, leaving the basal margin, an inwardly-narrowed, abbreviated, ante-median fascia, and a small patch at the apex testaceous;

the apical joint of the antennae (♂) extremely elongate. The anterior tibiae are compressed at the base much as in *S. elegans*, Mäkl., but the species seems best placed next *S. viridifasciata*.

100. **Statira calophaenoides,** n. sp.

Elongate, narrow, depressed, shining; testaceous, the eyes and two broad straight fasciae on the elytra (one basal, the other post-median) black; the elytra with scattered, long, erect, bristly hairs. Head sparsely, minutely punctate, shallowly foveate between the eyes, the latter large and not very widely separated; antennae very long and slender, joint 11 in ♂ nearly equalling the preceding five, and in ♀ a little longer than the preceding three, joints united. Prothorax as wide as the head in ♀, slightly narrower in ♂, longer than broad, cordate, dilated at the base, sparsely, minutely punctate, obsoletely canaliculate anteriorly. Elytra moderately long, at the middle twice as broad as the prothorax, gradually widened in their basal half, flattened on the disc, rounded at the apex; closely, finely crenato-striate, the interstices feebly convex towards the tip, 1, 3 and 5 with scattered setigerous impressions throughout their length, and 7 and 9 with three or four similar impressions on the apical half. Legs long; anterior femora stout; anterior tibiae rounded externally at the base.

Length $8\frac{4}{5}$–$9\frac{1}{4}$, breadth $2\frac{1}{2}$–$2\frac{4}{5}$ mm.

Hab. Peru (*ex coll. F. Bates*).

Two examples, assumed to be sexes. This insect superficially resembles a small *Calophaena* (a Tropical American genus of Carabidae), some of the species of which are similarly nigro-bifasciate. It is of about the same size and shape as *S. elegans*, Mäkl., the latter having metallic green elytra, etc.

101. **Statira segregata,** n. sp.

♂. Extremely like *S. calophaenoides*, and similarly coloured, except that the transverse black basal fascia on the elytra is broader than the submedian one; antennae very long and slender, joint 11 nearly as long as 6–10 united; the prothorax more narrowed anteriorly; the setigerous impressions on the elytra fewer in number, reduced to six along interstice 3, and two or three only towards the apex of 1, 5, 7, and 9.

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

Hab. Upper Amazons, Ega (*H. W. Bates*).

One male, sufficiently different from *S. calophaenoides* to require a distinctive specific or varietal name.

102. **Statira seminigra,** n. sp. (Plate XIII, fig. 25.)

Elongate, narrow, shining; rufo-testaceous, the eyes and the apical half of the elytra black; the elytra with a few, long, erect, bristly hairs. Head almost smooth, shallowly foveate in the middle between the eyes, the latter large and moderately distant; antennae long and slender, joint 11 as long as 8–10 united. Prothorax as wide as the head, not longer than broad, cordate, deeply constricted before the base, the basal margin much raised and laterally projecting; almost smooth, obsoletely canaliculate at the apex. Elytra long, subparallel in their basal half; closely, finely punctato-striate, the interstice 3 with six, and 5 and 9 each with three or four, widely scattered setigerous impressions, 1 also with two impressions at the apex. Femora more or less clavate.

Length $7\frac{3}{4}$, breadth $2\frac{2}{5}$ mm. (♀?)

Hab. Upper Amazons, San Paulo [de Olivenca] (*H. W. Bates*).

One specimen. Differs from the allied *S. calophaenoides* in having the apical half only of the elytra black, and the head and prothorax shorter and broader, the latter almost smooth, the elytra with scattered setigerous impressions on the interstices 3, 5, and 9.

103. **Statira triseilata,** n. sp. (Plate XIII, fig. 26, ♂.)

♂. Very elongate, shining; rufo-testaceous, the eyes and three oblique, angulate fasciae on the elytra (one before and one just beyond the middle, neither reaching the suture, and one, narrower, subapical, the last-named continued down the first interstice and outer margin to near the tip) black; the elytra with a few, long, erect, bristly hairs. Head almost smooth, longitudinally grooved between the eyes, the latter large, moderately distant; antennae slender, long, joints 8–10 decreasing in length, 11 extremely elongate, as long as 6–10 united. Prothorax as wide as the head, a little broader than long, subcordate, dilated at the base; sparsely, finely punctate at the base and with two deep widely separated foveae on the disc posteriorly. Elytra somewhat convex, very elongate, twice as broad as the prothorax, gradually widened to the middle, acuminate at the tip; closely, finely crenato-striate from base to apex, the interstices convex, 3, 5, and 7 with scattered setigerous impressions throughout their length, 1 and 9 also with several similar impressions on the apical half. Legs very long, rather slender.

Var. The upper surface uniformly castaneous.

Length $11\frac{1}{2}$–12, breadth $3\frac{1}{2}$–$3\frac{4}{5}$ mm.

Hab. Colombia, Ibague (*Mus. Brit.*).

Two specimens, acquired in 1846. A very elongate, somewhat convex, shining, rufo-testaceous or castaneous insect, with sharply, obliquely, nigro-trisellate elytra in the form selected as the type, the elytral striae rather deeply impressed and crenato-punctate, the alternate interstices with scattered setigerous impressions. The two foveae near the base of the prothorax cannot be accidental. The aedeagus (partly exposed in the type) is narrowed to the tip, and a pair of narrow curved claspers are visible beneath the fifth ventral segment. *S. trisellata* cannot be identified amongst the 28 Colombian *Statirae* described by Mäklin in 1878; it is coloured somewhat as in *Colparthrum gerstäckeri*, Kirsch. The immaculate form must come near his *S. ferruginea*: the latter is said to have a somewhat densely punctured prothorax and the elytral striae evanescent towards the apex.

104. **Statira paraensis**, n. sp.

Moderately elongate, narrow, the head and prothorax subopaque, the elytra shining; testaceous, the eyes black, the elytra with a narrow, nigro-fuscous, transverse, undulate, post-median fascia—sometimes extending narrowly forwards along the suture and dilated anteriorly into a faint triangular scutellar patch, sometimes not reaching the suture or altogether wanting; the elytra with a few very long, erect, bristly hairs. Head almost smooth, longitudinally impressed between the eyes, the latter large and somewhat widely separated; antennae long, slender, joint 11 in ♂ about equalling 8–10, and in ♀ 9 and 10, united. Prothorax as long as broad, nearly or quite as wide as the head, cordate, dilated at the base; almost impunctate. Elytra moderately long, gradually widened to the middle; very finely, closely punctato-striate, smoother at the apex, the interstices flat, 3 with about seven conspicuous setigerous impressions scattered along its entire length, 5 and 9 with three or four similar impressions on the apical half, and 1 with one or two near the tip. Aedeagus of ♂ strongly acuminate at the tip.

Length $5\frac{1}{5}$–6, breadth $1\frac{1}{2}$–$2\frac{1}{5}$ mm. (♂♀.)

Hab. Lower Amazons, Para (*H. W. Bates*).

Five specimen—three fasciate, two immaculate. A form of the Central American *S. picta*, Champ., with the apical joint of the antennae shorter in both sexes (in *S. picta*, ♂, equalling 7–10 united), the head with a deeper longitudinal groove between the eyes, and the elytral markings, when present, showing a tendency to extend forward along the suture to the scutellar region (instead of along the outer margin to the humeri, as in *S. picta*), the scattered setigerous impressions along the third interstice very conspicuous.

105. **Statira circumducta**, n. sp.

♂. Moderately elongate, depressed, shining; rufo-testaceous, the eyes black, the elytra with the suture narrowly, and a common, transverse, curved median fascia, which is continued forwards along the outer part of the disc to the base, nigro-fuscous; the elytra with a few long erect setae. Head broad, sparsely, minutely punctate, grooved down the middle between the eyes, the latter large and separated by about the width of one of them; antennae moderately long, rather slender, joint 11 slightly longer than 8–10 united. Prothorax narrower than the head, about as long as broad, subcordate, dilated at the base; almost smooth, faintly canaliculate down the middle anteriorly. Elytra twice as broad as the prothorax, moderately long, gradually widened to the middle, obliquely depressed below the base; closely, finely punctato-striate, the interstices 3, 5 and 9 each with about six widely separated setigerous impressions, and 1 and 7 with one or two similar impressions near the apex.

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

Hab. Ecuador (*Buckley*).

One male. Very like *S. vageguttata*, Pic, and its allies, but wanting the deep lanciform sulcus on the front of the prothorax, the dark markings on the anterior half of the elytra partly enclosing a broad, elongate, subquadrate patch of the testaceous ground-colour on the disc of each of them.

106. **Statira subfenestrata**, n. sp.

Moderately elongate, narrow, shining, testaceous; the eyes black, the elytra with a broad basal and a narrow median fascia, connected along the suture and approaching one another at the sides, nigro-piceous; the elytra with a few long, erect, bristly hairs. Head large, broad, obliquely narrowed and well developed behind the eyes, sparsely, obsoletely punctate, the eyes small, widely separated;

antennae very slender, moderately long, joint 11 barely the length of 9 and 10 united. Prothorax narrow, longer than broad, cordate, widened at the base, sparsely, finely punctate. Elytra moderately elongate, twice as broad as the prothorax, gradually widened to the middle, acuminate posteriorly; shallowly, minutely striato-punctate, smooth at the apex, the interstices flat, 3 and 5 with four or five widely scattered conspicuous setigerous impressions, 7 and 9 also with two or three similar impressions towards the tip.

Length $5\frac{1}{5}$, breadth $1\frac{2}{3}$ mm. (♀?)

Hab. AMAZONS, Santarem (*H. W. Bates*).

One specimen, imperfect. A very narrow, testaceous insect approaching *S. vageguttata*, Pic, with the elytra somewhat similarly maculate; the head large, the eyes small, the antennae unusually slender, and with a feebly developed apical joint, the prothorax quite narrow, punctulate, and without sulcus in front, the seriate elytral punctures very fine and shallow. The prothorax and elytra are differently shaped from those of *S. paraensis.*

107. **Statira multinotata.** (Plate XIII, fig. 27, ♀.)

Statira multinotata, Pic, Mélanges exot.-entom. iv, p. 15 (Sept. 1912).

Antennal joint 11 in ♂ as long as 7–10, in ♀ as long as 8–10, united.

Hab. BRAZIL (*coll. Pic*: type), Minas Geraes (*Mus. Brit.*).

Three examples in the Museum, two of which are from Minas Geraes, are doubtless referable to this species. A narrow, elongate insect, $8\frac{1}{2}$–9 mm. in length (Pic gives 10 mm.), rufo-testaceous in colour, the elytra flavous, with the numerous scattered setigerous impressions along the alternate interstices each placed in a sharply-defined, subquadrate, blackish or fuscous spot, those on the first (sutural) interstice confined to the apical half. The eyes are large and somewhat narrowly separated, the space between them depressed down the middle.

108. **Statira vageguttata.** (Plate XIII, fig. 28, ♂.)

Statira vageguttata, Pic, L'Échange, xxviii, p. 75 (Oct. 1912).
Statira vagenotata, Pic, loc. cit. p. 76.

Var. Prothorax with a narrow black vitta on each side near the outer margin. Joint 11 of antennae in ♂ as long as four or five of the preceding joints united, in ♀ about equalling 8–10 united.

Length 5–8¼, breadth 1⅔–2⅔ mm. (♂♀.)

Hab. Brazil (*Mus. Brit.*, *Mus. Oxon.*), Rio de Janeiro (*Fry*), Constancia (*J. Gray* and *H. Clark*, Jan. 1857), Matusinhos [type of *S. vageguttata*] and Serra de Bernarda [type of *S. vagenotata*] (*coll. Pic*); Amazons (*H. W. Bates*, *ex coll. Fry*).

This seems to be one of the commonest species of the genus in the neighbourhood of Rio de Janeiro, but it was apparently unknown to Mäklin. The long series before me, including many specimens belonging to the Oxford Museum, illustrate the great variation in the development of the elytral markings, the additional variety here noted (eight specimens seen) simply differing in having a submarginal black line on each side of the prothorax. The commonest form has three dark angulate fasciae on the elytra—one just below the base, another at the middle, these connected along the sutural and outer margins, and a narrower one towards the apex, this latter connected with the median fascia along the suture and outer margin and down the middle of the disc (the fuscous markings thus enclosing on each elytron a large ante-median discoidal patch, and two transversely placed oblong marks behind it, of the yellowish ground-colour); the dark coloration sometimes extends over the whole of the apical portion, or it may be almost entirely or in great part obliterated. *S. vageguttata* is readily recognisable by the deep, sharply-defined, elongate-triangular sulcus on the disc of the prothorax in front; the prothorax itself is sparsely, very finely punctate, and usually shining, sometimes opaque. The elytra are finely punctato-striate, the interstices 3, 5, 7, and 9 each with from two to four, and 1 with one or two, scattered setigerous impressions on the apical half. There is a specimen before me from the Dejean collection labelled with the MS. name *S. picta*, Buq. [*nec* Champ.] and one from the Oxford Museum is ticketed *S. varians*, Hope. The general resemblance of this insect to a spotted *Dromius* is rather striking.

109. **Statira incisicollis**, n. sp. (Plate XIII, figs. 29, antenna; 29*a*, prothorax, ♂.)

♂. Moderately elongate, narrow, depressed, shining; rufo- or flavo-testaceous, the 11th antennal joint slightly infuscate, the eyes, the elytra to a little beyond the middle, except around the scutellum and on an oblique or subtriangular space on the disc, and in one specimen a narrow, transverse oblique mark on the disc before the apex, black; the elytra with several erect bristly hairs towards the tip. Head broad, sparsely, minutely punctate, obsoletely canaliculate between the eyes, the latter large, separated by about the width of one of them; antennae (fig. 29) slender, moderately long, joints 3–10 rapidly decreasing in length, 7–10 moniliform, 11 extremely elongate, about as long as 3–10 united. Prothorax (fig. 29*a*) narrower than the head, about as long as broad, cordate, dilated at the base; sparsely, minutely punctate, and with a deep lanciform sulcus on the disc in front. Elytra moderately long, gradually widened to the middle; closely, finely punctato-striate, the interstices broad, feebly convex at the apex, 3, 5, and 9 with three or four scattered setigerous impressions on the posterior half, 1 also with a single impression near the tip.

Var. The prothorax broadly infuscate along the sides, the blackish portion of the elytra more extended, reaching the subapical mark. (♂.)

Length $5\frac{1}{3}$–6, breadth $1\frac{3}{4}$–2 mm.

Hab. Lower Amazons, Santarem (*H. W. Bates*: type); Brazil, Pernambuco (*Fry*: var.).

Described from three specimens, one of those from Santarem now wanting the antennae. A very close ally of *S. vageguttata*, Pic, with the apical joint of the ♂ antenna nearly as long as the rest united, and the joints preceding it moniliform. There is also a corresponding variety with a laterally fusco-vittate prothorax. It is just possible that these insects may be forms of *S. brasiliensis*, Pic (Mélanges exot.-entom. iv, p. 19), which is said to have a long terminal joint to the antennae; but without comparison, it would be unsafe to identify them as such.

110. **Statira xanthodera**, n. sp.

Moderately elongate, shining, the elytra sericeous; black, the prothorax, the femora at the base, and the tarsal claws testaceous; the elytra with a few long, erect, bristly hairs. Head almost smooth, well-developed behind the eyes, the latter small and widely separated; antennae short, not very slender, joint 11 equalling 8–10 united. Prothorax as wide as the head, transverse, subcordate, dilated at the base; smooth, with a very deep, sharply defined, oblong excavation on the disc in front. Elytra moderately long, about twice as broad as the prothorax, gradually widened to the middle, rounded at the apex; closely, minutely, very shallowly punctato-striate, the interstices flat, 3 with five, and 5, 7, and 9 with two or three, scattered setigerous impressions on the apical half, 1 also with a single impression near the tip.

Length 6, breadth $2\frac{1}{10}$ mm. (♀?)

Hab. Brazil, Santa Catharina (*Fry*).

One specimen. This is one of the very few species of the genus known to me with a deep, oblong, sulcus on the disc of the prothorax in front. This character brings it near *S. vageguttata*, Pic, from which it differs greatly in colour, and in having short antennae, smaller eyes, and very faintly striate elytra. The wholly black body and testaceous prothorax, too, are characteristic.

111. **Statira figurata.** (Plate XIII, fig. 30, ♀.)

Statira figurata, Mäkl., Act. Soc. Fenn. vii, p. 158 (1862).
?*Statira lunulata*, Pic, Mélanges exot.-entom. iv, p. 18 (Sept. 1912).

Elongate, rather broad, very shining; rufo-, the elytra flavo-testaceous, the eyes, the prothorax with a submarginal line on each side, and the elytra with a narrow, angulate post-basal and a broader curved median fascia—these markings connected along the suture and outer margin (the sutural stripe extending downwards to near the apex), and the post-basal fascia with a curved ramus extending forwards along the middle of the disc to the scutellum—black; the elytra and the sides of the head thickly set with very long, erect, setiform hairs, the legs, antennae, and under surface also with (easily abraded) hairs. Head broad, finely punctate, slightly impressed in the middle between the eyes, the latter separated by about the width of one of them; antennae with joint 11 about as long as three (♀) or four of the preceding joints united. Prothorax a little narrower than the head, as broad as long, subcordate, dilated at the base; rather closely, finely, conspicuously punctate. Elytra twice as broad as the prothorax, long, gradually widened to the middle; closely, finely punctato-striate, the interstices each with an irregular row of rather coarse, somewhat closely placed setigerous impressions extending from the base to the apex.

Length $7\frac{1}{2}$–9, breadth $2\frac{2}{3}$–3 mm.

Hab. Brazil, Rio de Janeiro (*Fry*), Constancia (*J. Gray*, Jan. 1857).

The two specimens here described, possibly ♂ and ♀, agree with Mäklin's description of *S. figurata*, from "Brazil," except in having the apical portion of the elytra flavo-testaceous, instead of black; but as some of the allied forms vary in this way, no importance need be attached to such a colour-difference, the five yellow spots on the basal half being exactly as he describes. *S. lunulata*, Pic, from Tijuca (a place near Constancia), which is compared with my figure of *S. conspicillata*, Mäkl., in the "Biologia," is said to have an irregular black ring enclosing a yellow patch on the anterior portion of each elytron. The specific identity of these insects, therefore, must remain in doubt till types are compared.

112. **Statira annulata.** (Plate XIII, fig. 31.)

Statira annulata, Mäkl., Act. Soc. Fenn. x, p. 643 (1875).

Elongate, rather narrow, shining; testaceous, the eyes black, the elytra flavous, with three common, angulate fasciae, connected along the suture, the first two along the sides also, and the second and third nearly coalescent along the fifth interstice, the first with a branch on the disc extending forwards to the base, nigro-fuscous (the dark markings enclosing nine spots, arranged 3, 2, 4, of the yellowish ground-colour); thickly clothed, the legs included, with long, soft, erect hairs. Head sparsely, rather coarsely punctate, the eyes somewhat narrowly separated; antennae moderately long and slender, joint 11 as long as 9 and 10 united. Prothorax longer than broad, oblong-subcordate, a little dilated at the base; very coarsely, sparsely punctate. Elytra long, about twice as wide as the prothorax, gradually widened to the middle; closely, finely punctato-striate, the interstices each with an irregular series of closely placed piligerous punctures.

Length $7\frac{1}{5}$–$8\frac{1}{3}$, breadth $2\frac{1}{5}$–$2\frac{4}{5}$ mm.

Hab. Brazil, Rio de Janeiro and Espirito Santo (*Fry*).

The two specimens, probably ♂ and ♀, from which the above description has been taken agree with Mäklin's diagnosis of his *S. annulata*, from Brazil, except that they apparently have relatively narrower elytra. The differences given by him to separate *S. annulata* and *S. figurata* (as here recognised) also apply, so that there cannot be much doubt about the identification of either of them. A fresh description, however, was required in each case.

113. **Statira quadriplagiata,** n. sp. (Plate XIII, fig. 32, ♂.)

♂. Moderately elongate, narrow, shining; testaceous, the eyes black, the elytra flavous, with a broad, common, triangular scutellar patch (reaching the humeri), a large triangular patch on the outer part of the disc just beyond the middle (extending inwards to the second stria), and a common apical patch, nigro-fuscous; thickly clothed, the legs included, with long, soft, erect hairs. Head rather small, coarsely punctate, the eyes large and somewhat narrowly separated; antennae comparatively short, rather stout, joint 11 as long as 8–10 united. Prothorax convex, about as long as broad, somewhat oval, scarcely dilated at the base; coarsely, rather closely punctate. Elytra about twice as wide as the prothorax, long, gradually widened to the middle; closely, finely punctato-striate, the interstices each with an irregular series of rather closely placed piligerous punctures extending from the base to the apex. Aedeagus slender and acuminate at the tip.

Length $6\frac{1}{2}$, breadth $2\frac{1}{10}$ mm.

Hab. Brazil, Rio de Janeiro (*Fry*).

One male. Closely related to *S. annulata*, Mäkl., but with very differently marked elytra (resembling *S. scutellaris*, Pic, *S. evanescens*, Champ., etc., in this respect), the antennae less elongate, the prothorax not so long, and still more coarsely punctured. The piligerous punctures on each elytral interstice are closely placed and extend from the base to the apex, as in *S. annulata* and *S. figurata*.

114. **Statira bifurcata,** n. sp.

♀. Elongate, narrow, opaque, the elytra moderately shining; testaceous, the eyes black, the elytra with a narrow sutural stripe, which is obliquely bifurcate before the base and nearly reaches the apex, and three longitudinal streaks at about the middle (on interstices 3, 5, and 7, that on 7 longer than the others), nigro-piceous; the elytra with scattered long, erect, bristly hairs. Head alutaceous, closely, roughly punctulate, the eyes large and separated by about half the width of one of them; antennae rather slender, joint 11 nearly as long as 8–10 united. Prothorax longer than broad, as wide as the head, cordate, dilated at the base; closely, very finely scabroso-punctulate, the basal groove almost obsolete. Elytra long, at the middle twice as wide as the prothorax, rapidly narrowed and acuminate posteriorly; closely, very finely punctato-striate, the alternate interstices 1, 3, 5, 7, and 9 with a series of somewhat closely placed setigerous impressions extending throughout their length, the impressions each preceded by a small tubercle.

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

Hab. Brazil, Jatahy, Province of Goyas (*Pujol, ex coll. Fry*).

One female. Not unlike *S. quadriplagiata,* the head and prothorax opaque and scabroso-punctulate, the prothorax longer and with shallower basal groove, the elytra very differently marked and with more numerous tubercles along the alternate interstices. Pic has described various *Statirae* from the same Province, but the present insect is not included amongst them : *S. goyasensis*[16] (length 9 mm.) also has the elytra testaceous, with a black sutural stripe enlarged towards the scutellum, but the other particulars given do not accord with *S. bifurcata,* and the tubercles are not mentioned.

115. **Statira tenuipes,** n. sp.

♂. Elongate, narrow, depressed, slender, opaque above, shining beneath; testaceous, the eyes black, the elytra with the suture narrowly piceous to near the apex, the latter with a few bristly hairs. Head broad, alutaceous, obsoletely canaliculate between the eyes and obliquely narrowed behind them, the eyes large, somewhat distant; antennae moderately long, slender, joint 11 nearly equalling 7–10 united. Prothorax much longer than broad, considerably narrower than the head, rounded at the sides, the latter deeply sinuate before the base, the basal margin not raised, the surface alutaceous. Elytra elongate, at the middle about twice as wide as the prothorax somewhat acuminate posteriorly; closely, very finely, shallowly punctato-striate, the interstices feebly convex, 3 and 5 with about six widely scattered setigerous impressions, 1 also with three others near the tip, and 9 with five impressions beyond the middle. Legs long and slender.

Length $7\frac{1}{2}$, breadth $2\frac{1}{8}$ mm.

Hab. Brazil, Bahia (*Reed*).

One specimen. This is one of several peculiar forms obtained by Reed at Bahia. It resembles *S. bifurcata,* from Goyas, but has a much broader head, a longer and smoother prothorax, non-tuberculate elytra, with the suture only infuscate, and longer legs.

116. **Statira cruciata,** n. sp.

Elongate, rather broad, moderately shining; testaceous, the head and prothorax reddish, the eyes black; the elytra with an ill-defined, common, curved post-median fascia, extending forwards

[16] Mélanges exot.-entom. iv, p. 20 (Sept. 1912).

along the outer margin to the humeral callus, and the base indeterminately, infuscate, the surface bearing a few bristly hairs. Head small, narrower than the prothorax, closely, finely, conspicuously punctate, unimpressed between the eyes, the latter moderately large and somewhat distant; antennae slender, short, joint 11 equalling 7–10 united. Prothorax oblongo-subquadrate, distinctly margined laterally, slightly hollowed at the sides anteriorly, and sinuously narrowed towards the base, the anterior angles obtuse, prominent, the hind angles very slightly projecting, the basal margin but little raised, the transverse groove in front of it deeply impressed laterally; densely, minutely punctate. Elytra widening to the middle and there twice as wide as the prothorax; finely, closely, deeply punctato-striate, the interstices convex, 3 and 5 with four or five widely scattered setigerous impressions, and 1 and 9 with two or three others near the apex. Legs moderately long.

Length 9, breadth 3 mm. (♀?)

Hab. Nicaragua, Chontales (*Janson*).

One specimen. differing from all the Central American forms enumerated by myself in the "Biologia" in 1889. It is perhaps nearest related to the Mexican *S. veraecrucis*, from which it is separable by the less rugose. shining head. the longer, larger, and less scabrous prothorax, and the common, ill-defined, fuscous post-median fascia of the elytra.

117. **Statira haitiensis**, n. sp.

Elongate, rather dull; nigro-piceous or black, the prothorax and tarsi rufous or rufo-testaceous, the elytra nigro-cyaneous, the antennae sometimes wholly or in part ferruginous; the elytra with a few fine, long, erect hairs. Head rather short, narrower than the prothorax, sparsely, minutely punctate, the eyes large, somewhat distant; antennae slender, moderately long, joint 11 equalling the three or four preceding joints united. Prothorax transverse, faintly margined laterally, rounded at the sides, constricted before the prominent hind angles, the basal margin raised and the transverse sulcus in front of it sharply defined; sparsely, minutely punctate. Elytra long, gradually widened to the middle, and there twice as wide as the prothorax; finely, closely, deeply punctato-striate, the interstices more or less convex, 3 with nine or ten, and 5 and 9 with several, setigerous punctures scattered between the base and apex. Legs moderately long.

Length $6\frac{1}{2}$–$7\frac{3}{4}$, breadth $2\frac{1}{5}$–$2\frac{2}{3}$ mm. (♀.)

Hab. HAITI, Port au Prince (*ex coll. Fry*).

Four examples, possibly all females. This species bears some resemblance to the Antillean *S. vittata*, Champ., but it is very differently coloured, and has a shorter head and prothorax, and the latter finely margined at the sides. Also approaching *S. croceicollis*, Mäkl. (from Florida, Georgia, and Alabama), and other N.-American forms.

118. **Statira fulvicollis.**

Anthicus fulvicollis, Fabr., Syst. Eleuth. i, p. 290 (1801).[1]
Statira fulvicollis, Mäkl., Act. Soc. Fenn. vii, p. 160 (1862).[2]

Var. *a*. Elytra each with a reddish or testaceous spot below the base.

Statira fulvicollis, v. *discoidalis*, Pic, Mélanges exot.-entom. iv, p. 13 (1912).[3]

Var. β. Prothorax black, the elytra sometimes fuscous or piceous.

Anthicus fuscipennis, Fabr., loc. cit.[4]
Statira fuscipennis, Mäkl., Act. Soc. Fenn. vii, p. 160.[5]
Statira exigua, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 360 (1878).[6]

Var. γ. Prothorax black; the elytra and abdomen testaceous at the base, or the elytra (a triangular scutellar patch and the suture excepted) testaceous in their basal half.

Anthicus abdominalis, Fabr., loc. cit.[7]
Statira abdominalis, Mäkl., Act. Soc. Fenn. vii, p. 160.[8]

Var. δ. Prothorax black, the elytra with an oblong yellowish mark on the disc before the middle.

Statira atricollis, Pic, Mélanges exot.-entom. iv, p. 20 (Sept. 1912).[9]

Var. ϵ. Prothorax black, the elytra each with a yellow stripe on the disc extending from the base to beyond the middle.

Statira flavovittata, Pic, Mélanges exot.-entom. xi, p. 18 (Nov. 1914).[10]

?Var. ζ. Prothorax, a broad oblong stripe on the disc of each elytron (extending from a little below the base to beyond the middle and almost reaching the suture), under surface, femora, and tibiae (the anterior pair excepted) testaceous or flavous.

Hab. South America [124578]; Colombia [6], Bogota; Guiana, Cayenne [3]; Brazil [10] (*Miers, in Mus. Oxon.*: var. *flavovittata*), Rio de Janeiro, Espirito Santo, Bahia, Pernambuco [var. ζ]; Amazons, Para, Nauta [var. α]; Bolivia [9].

The numerous specimens before me connect the named forms of this very variable *Statira*, and it is not impossible that *S.* (*Anthicus*) *ruficollis*, Fabr., which has a red head and prothorax, appertains to the same species. Mäklin did not identify any of these Fabrician insects amongst the material examined by him; but there can be little doubt that the three named quoted above refer to one and the same species, that with a red or yellow prothorax being apparently confined to Brazil and Guiana. An example of the var. α (= *discoidalis*, Pic) from the F. Bates collection (from that of Dejean) is labelled with the MS. name *Pedilus sanguinicollis*.[17] The allied *S. irregularis* and *S. albofasciata*, Champ., from Central America, are almost equally variable in colour. *S. fulvicollis* is a small, polished, Anthiciform insect, wholly or in part black; the elytra feebly striato-punctate, with an irregular series of numerous larger, rough, setigerous impressions along each of the interstices; the antennae gradually thickened outwards, the apical joint about as long as the two preceding joints united in both ♂ and ♀; the head transverse, foveate in the middle between the eyes, the latter small; the tibiae somewhat curved in ♂. There is a broken specimen of the var. *flavovittata* in the Oxford Museum. These forms should perhaps be removed from the genus *Statira*.

119. **Statira cyanipennis.**

Statira cyanipennis, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 36 (1878) (nec *S. cyanipennis*, Mäkl., Act. Soc. Fenn. vii, p. 591, and x, p. 647).
Statira colombica, Champ., Biol. Centr.-Am., Coleopt. iv, 2, p. 62, nota (nom. prov.).

Hab. Colombia [type], Bogota (*ex coll. F. Bates*).

Two specimens from the F. Bates collection agree with Mäklin's description, except that they have the abdomen black, instead of dilute fulvous. They are separable from typical *S. fulvicollis*, F., by the prothorax being more

[17] *Cf.* B. C.-Am., Coleopt. iv, 2, p. 46.

dilated anteriorly (thus appearing narrower at the base) and a little shorter, and the elytra brilliant cyaneous in colour. The first species described by Mäklin under the name *S. cyanipennis* (1862) was selected in 1889 as the type of *Sphragidophorus*.

120. **Statira cayennensis,** n. sp.

Moderately elongate, somewhat robust, widened posteriorly, very shining; testaceous, the head and palpi, the antennal joints 1 and 4–10, in part or entirely, nearly the apical half of the elytra (a spot on the outer margin near the tip excepted), and the abdomen in part, black, the tibiae and tarsi nigro-piceous; the elytra and legs somewhat thickly, and the head sparsely, clothed with long, fine, erect or projecting, pallid hairs. Head short, barely as wide as the prothorax, well developed behind the eyes, very sparsely punctulate; eyes small, widely separated; antennae moderately long, gradually thickened outwards, joint 11 equalling 9 and 10 united. Prothorax almost smooth, scarcely as long as broad, transversely cordate, strongly constricted before the base, the basal margin raised and thickened, preceded by a deep groove. Elytra moderately long, widening to the middle, and there twice as wide as the prothorax, somewhat acuminate posteriorly; finely, shallowly, confusedly punctate, the seriately-arranged punctures barely distinguishable from those of the interstices. Legs rather stout, the femora clavate.

Length 6, breadth 2 mm.

Hab. Guiana, Cayenne (*Mus. Brit.*).

One specimen (? sex), injured by pinning, acquired in 1858. An insect resembling *S. bicolor*, Champ., from Panama, except that the head is black, but with the antennae (less the flavous apical joint) and elytra formed much as in the Central American *S. albofasciata*, Champ. *S. fulvicollis*, F., is also an allied insect. The Peruvian *S. nigroapicalis*, Pic, compared with *S. bicolor* by its describer, must be a very different species, simply resembling the latter in colour.

121. **Statira semiviolacea,** n. sp.

Moderately elongate, robust, very shining; rufo-testaceous, the apical half of the elytra and the suture narrowly thence to the base, cupreo-violaceous, the eyes, joints 2–7 of the antennae, the metasternum, abdomen, tibiae, and tarsi black or piceous; the elytra with a few bristly hairs. Head small, much narrower than the prothorax, sparsely, finely punctate, foveate on each side between the eyes, and narrowing behind them; eyes transverse, small, distant, feebly convex, not reaching the base of the head; antennae rather short, moderately stout [joint 11 missing]. Prothorax smooth, broader than long, arcuately dilated at the sides, narrowed and constricted at the base, the basal margin preceded by a deep groove; the disc with a very large, deep, rounded excavation on each side just behind the middle. Elytra moderately long, at the middle about twice as wide as the prothorax, conjointly rounded at the tip; closely, finely, deeply punctato-striate, the interstices convex, flatter on the disc, 3 with four setigerous impressions scattered between the base and apex, 5 and 9 also with two or three widely separated impressions. Legs rather short and stout, the anterior femora strongly clavate.

Length $6\frac{3}{4}$, breadth $2\frac{1}{2}$ mm. (♂.)

Hab. Upper Amazons, San Paulo [de Olivenca] (*H. W. Bates*).

One specimen. Near *S. bicolor*, Champ., from Panama, the prothorax more dilated at the sides and with a very large, deep, rounded excavation on each side of the disc (? accidental); the elytra conjointly rounded at the apex, sharply punctato-striate, and with the apical half and suture cupreo-violaceous, the setigerous impressions fewer in number. The apical joint of the antennae wanting in the type, is probably elongate, at least in the male.

122. **Statira cribriceps,** n. sp.

Elongate, narrow, widened posteriorly, shining; reddish-brown or obscure rufo-testaceous, the femora paler at the base, more or less infuscate in their outer half, the eyes black; somewhat thickly clothed with long, fine, erect, bristly hairs. Head large, broad, well developed behind the eyes, rounded at the sides posteriorly, closely, coarsely punctate, with a shallow, transverse, inter-ocular impression, the frontal groove deep and almost straight; eyes small, convex, widely separated; antennae long, slender, joint 11 in both sexes about equalling 9 and 10 united. Prothorax nearly as wide as the head, convex, longer than broad, rounded at the sides anteriorly, feebly sinuate and gradually narrowing towards the base, the basal margin slightly raised; closely, coarsely punctate. Elytra rather convex in ♂, flatter in ♀, moderately long, rapidly widening to the middle, and there about twice the breadth of the prothorax, arcuately narrowed and somewhat acuminate posteriorly, the humeri obtuse; coarsely, closely striato-punctate, the punctures transverse and impinging on the narrow raised interstices, the alternate interstices 1, 3, 5, 7, and 9 each with a row of somewhat closely placed, fine, setigerous impressions. Legs moderately long, the femora rather stout.

Length 6–6⅖, breadth 1⅘–2⅕ mm. (♂♀.)

Hab. Brazil, Espirito Santo (*Fry*: ♂, type), Paraná (*ex coll. F. Bates*: ♀).

One pair. A peculiar form related to *S. cylindricollis*, Mäkl., from Colombia, Venezuela, and Trinidad; but much larger and longer than that insect, with a shorter, broader head, and long, slender antennae, the elytra with rows of closely packed coarse crenate punctures separated by narrow raised interstices, the alternate ones each bearing numerous long bristly hairs, the humeri less prominent.

123. **Statira melanoptera,** n. sp.

♀. Elongate, narrow, widened posteriorly, shining; rufo-testaceous, the eyes, palpi, elytra, and legs (the bases of the femora, and the tibiae and tarsi in part, excepted) black or piceous, the abdomen and basal joints of the antennae also in part infuscate; the elytra with numerous long, fine, bristly hairs. Head large, broad, well developed behind the eyes, rounded at the sides posteriorly, closely, rugosely punctate, the frontal groove deep and almost straight; eyes small, convex, widely distant; antennae long, slender, joint 11 equalling 9 and 10 united. Prothorax slightly longer than broad, narrower than the head, constricted before the prominent hind angles, the basal margin moderately raised; rather coarsely, closely punctate. Elytra long, somewhat convex, rapidly widening to the middle, somewhat acuminate posteriorly, the humeri obtuse; closely, deeply, rather coarsely punctato-striate, the punctures transverse, crenate, the interstices more or less convex, as wide as the striae, 1, 3, 5, 7, and 9 each with a series of numerous, conspicuous, setigerous impressions.

Length 7, breadth 2⅛ mm.

Hab. Brazil (*ex coll. F. Bates*).

One specimen. A close ally of *S. cribriceps*, with the elytra and the outer halves of the femora black, the head not so coarsely punctate, the prothorax less constricted behind, the elytra with smaller seriate punctures and broader interstices, the alternate ones with conspicuous setigerous impressions, as large as those of the striae.

124. **Statira cylindricollis.** (Plate XIII, fig. 33, ♂.)

Statira cylindricollis, Mäkl., Öfv. Finska Vet.-Soc. Förh. xx, p. 361 (1878); Fairm., Ann. Soc. Ent., Fr. 1892, p. 97.

Hab. COLOMBIA [type]; VENEZUELA, Caracas and San Esteban (*Simon*), Cumana (*ex coll. F. Bates*); TRINIDAD (*F. Birch, G. E. Bryant, coll. Fry*).

A small blackish or rufo-piceous, Anthiciform insect, with a long head and a narrow subcylindrical prothorax, both of which are coarsely, closely punctate; the antennae rufo-testaceous to about the middle, thickened and infuscate towards the apex, joint 11 stout and about as long as 9 and 10 united in both sexes; the eyes small, prominent, distant from the base of the head; the elytra rather short, comparatively broad, strongly, transversely impressed below the base, deeply punctato-striate, the interstices more or less convex, 3, 5, 7, and 9 with several widely scattered setigerous impressions, 1 also with two or three others near the apex. The peculiarly shaped, elongate head is not mentioned in the descriptions of either of the above-quoted authors. A Trinidad specimen is figured.

125. **Statira anthicoides.**

Statira anthicoides, Kirsch, Berl. Ent. Zeitschr. 1873, p. 412.

Statira anthicoides, v. *staudingeri*, Pic, L'Échange, xxviii, p. 76 (1912).

Hab. PERU, Chanchamayo (*ex coll. F. Bates*).

A close ally of *S. cylindricollis*, Mäkl., with the upper surface more shining; the head larger and broader; the prothorax deeply constricted before the base, and much more finely punctate; the elytra varying in colour from rufescent, a common, elongate, black patch at the base of the suture excepted, to entirely black (var. *staudingeri*), the interstices flatter, the striae shallow.[18]

126. **Statira filicornis,** n. sp.

Moderately elongate, slender, widened posteriorly, shining; obscure testaceous, the eyes and elytra black, the basal joints of the antennae fusco-annulate, the tarsi slightly infuscate; the

[18] This is the Peruvian insect mentioned in the "Biologia" (Coleopt. iv, 2, p. 73) under the description of the genus *Rhosaces*.

elytra with a few bristly hairs. Head almost smooth, very large, much broader than the prothorax, greatly developed behind the small, widely separated, convex eyes, and arcuately narrowed behind them, the inter-ocular space transversely bifoveate in the middle posteriorly; antennae very slender, rather short (joints 8–11 missing). Prothorax narrow, longer than broad, oblongo-cordate, constricted before the moderately prominent basal margin; closely, finely punctate, smoother on the anterior half, the disc obsoletely canaliculate anteriorly and slightly depressed in the middle at the base. Elytra moderately long, at the base twice as broad as the prothorax, widening to the middle, arcuately narrowed posteriorly, transversely flattened anteriorly, and rounded at the tip; very finely striato-punctate to near the apex, the interstices almost flat, alutaceous, 3 and 5 with a series of five or six widely scattered, small setigerous impressions, 1, 7, and 9 also with two or three impressions near the tip. Legs slender.

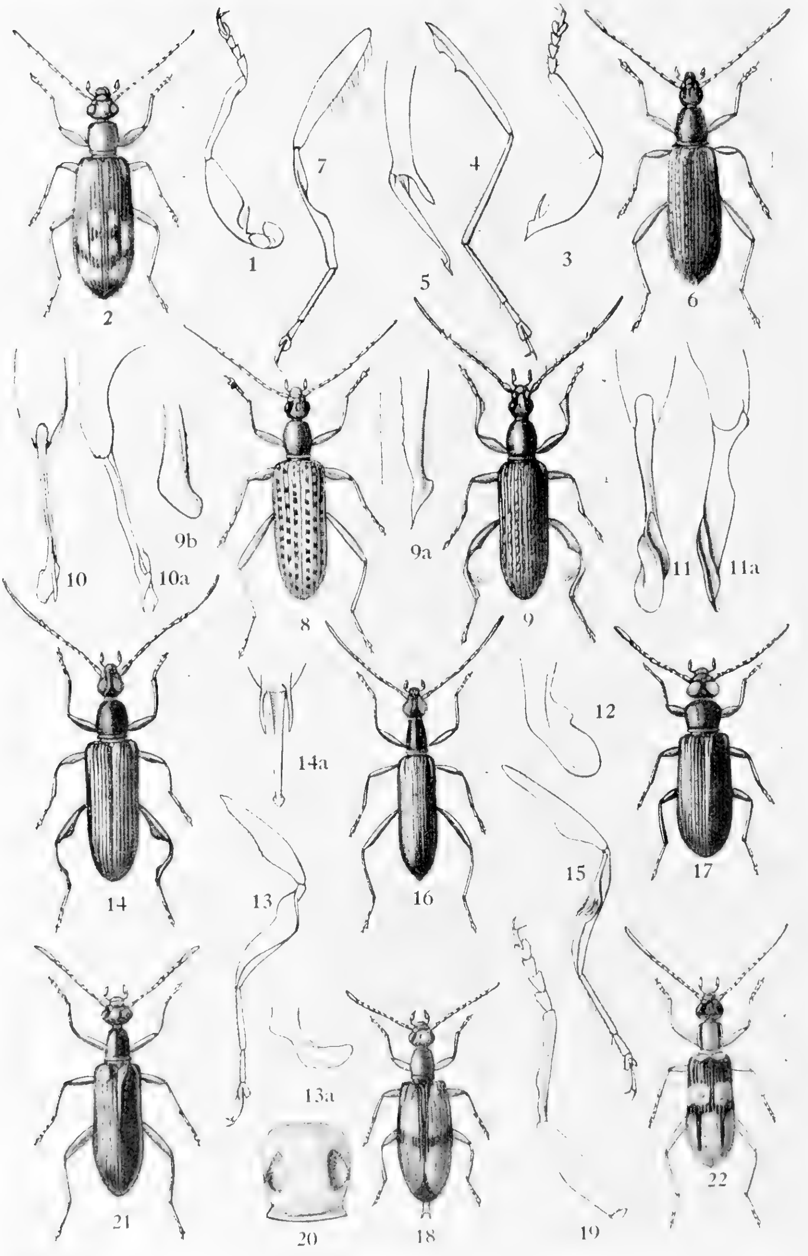
Length 6, breadth 2 mm.

Hab. Peru (*ex coll. F. Bates*).

One specimen. The large, posteriorly developed head and small eyes bring this species near *S. anthicoides*, Kirsch, also from Peru. *S. filicornis*, however, differs from the latter in its much more slender build, the smoother testaceous head and prothorax, the subfiliform antennae, the longer, duller, less convex, non-excavate elytra, and the pallid legs.

127. **Statira perforata,** n. sp.

♂. Elongate, narrow, depressed, shining, somewhat thickly clothed with soft, fine, semi-erect hairs (now mostly abraded in the type); piceous, the head and antennae black, the elytra with a greenish lustre. Head rather short, coarsely, confluently, rugosely punctate, the eyes small, widely separated, depressed, the labrum large; antennae moderately long, thickened outwards, joint 10 transverse, 11 stout, about equalling 7–10 united. Prothorax uneven, wider than the head, longer than broad, feebly rounded at the sides, the latter slightly sinuate before the base, the basal margin moderately prominent; very coarsely, confluently, foveolato-punctate. Elytra barely twice the width of the prothorax, not very elongate, rounded at the apex, depressed below the base; closely, rather finely crenato-striate, the interstices feebly convex, narrow, each with a row of piligerous impressions, which are of about the same size as the transverse punctures of the striae. Legs rather stout, the intermediate and posterior femora transversely strigose



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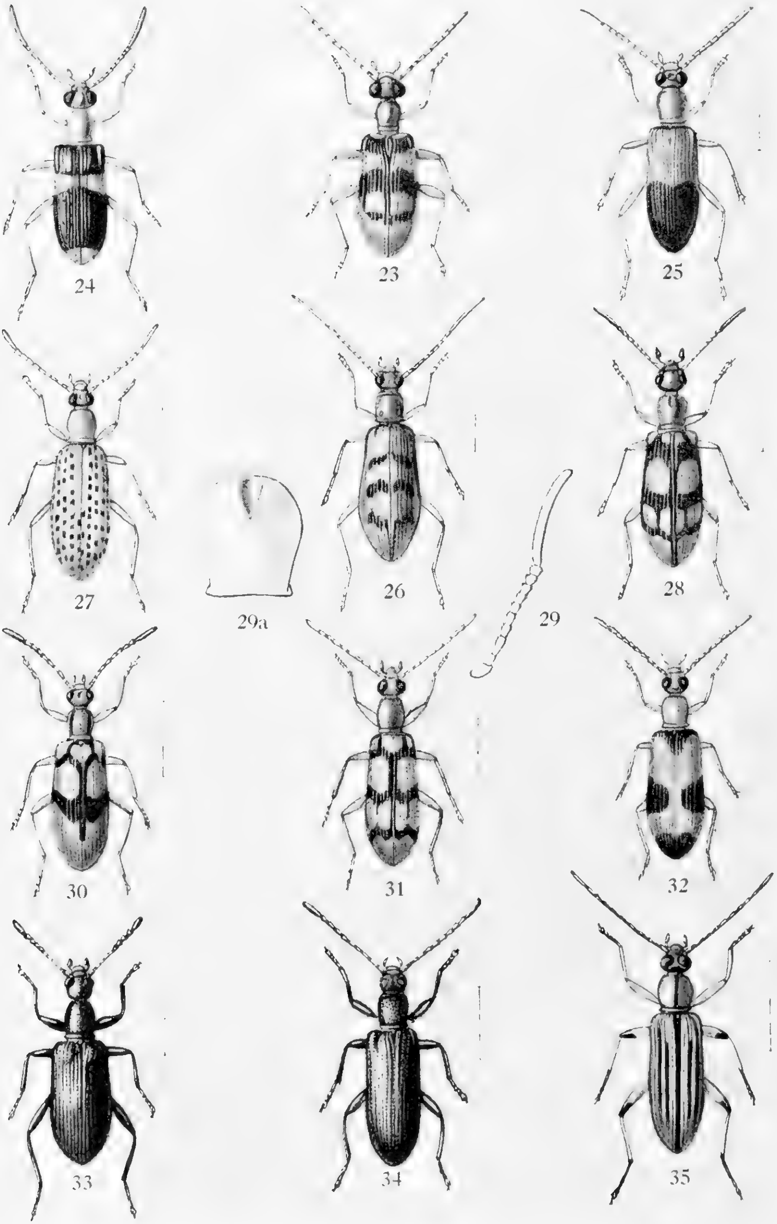
TROPICAL AMERICAN LAGRIIDAE.

Explanation of Plate XII.

Fig. 1♂. *Statira costaricensis*, Champ. [Costa Rica and Colombia], anterior leg.
- 2♂. *flavosignata*, n. sp. [Ecuador].
- 3♂. ,, *suturalis*, Mäkl. [Brazil], anterior leg.
- 4♂. ,, *gemmifer*, Mäkl. [Brazil], posterior leg.
- 5♂ ,, *agroides*, Lep. et Serv. [Brazil], aedeagus, in profile, showing the large basal piece.
- 6. ,, *longiceps*, n. sp. [Brazil].
- 7♂. ,, *longicollis*, Mäkl. [Brazil], posterior leg.
- 8♂. ,, *meleagris*, Mäkl. [Brazil].
- 9♂. ,, *catenata*, Mäkl. [Brazil]; 9*a*, penis-sheath, in profile; 9 *b*, ditto, from above.
- 10♂. ,, *viridipennis*, Lep. et Serv. [Brazil], aedeagus, showing the large basal piece; 10*a*, ditto, in profile.
- 11♂. ,, *geniculata*, Mäkl. [Brazil], aedeagus, showing the large basal piece; 11*a*, ditto, in profile.
- 12♂. ,, *asymmetrica*, n. sp. [Brazil], penis-sheath.
- 13♂. ,, *tortipes*, n. sp. [Brazil], posterior leg; 13*a*, penis-sheath.
- 14♂. ,, *arcuatipes*, Pic [Brazil]; 14*a*, aedeagus.
- 15♂. ,, *fuscitarsis*, Mäkl. [Brazil], posterior leg.
- 16♂. ,, *sphenodera*, n. sp. [Brazil].
- 17♂. ,, *eurydera*, n. sp. [Amazons].
- 18♀. ,, *presuturalis*, Pic [Brazil].
- 19♂. ,, *elegans*, Mäkl. [Brazil], anterior leg.
- 20♂. ,, *distigma*, n. sp. [Peru], prothorax.
- 21♂. ,, *casnonioides*, n. sp. [Brazil].
- 22♂. ,, *Statira bryanti*, Pic [Trinidad].



TROPICAL AMERICAN LAGRIIDAE.

Explanation of Plate XIII.

Fig. 23♂. *Statira connexa*, n. sp. [Amazons].
24♂. ,, *elegantula*, n. sp. [Amazons].
25. ,, *seminigra*, n. sp. [Amazons].
26♂. ,, *trisellata*, n. sp. [Colombia].
27♀. ,, *multinotata*, Pic [Brazil].
28♂. ,, *vageguttata*, Pic [Brazil].
29♂. ,, *incisicollis*, n. sp. [Brazil], antenna; 29*a*, prothorax.
30♀. ,, *figurata*, Mäkl. [Brazil].
31. ,, *annulata*, Mäkl. [Brazil].
32♂. ,, *quadriplagiata*, n. sp. [Brazil].
33♂. ,, *cylindricollis*, Mäkl. [Colombia, Venezuela, and Trinidad].
34♂. ,, *pilosa*, n. sp. [Brazil].
35♂. ,, *haemonioides*, n. sp. [Brazil].

on their inner face, the tibiae somewhat curved at the base. Aedeagus stout, acuminate and curved upwards at the tip.

Length $5\frac{7}{8}$, breadth $1\frac{7}{8}$ mm.

Hab. Mexico (*Truqui, ex coll. Fry*).

One male. An isolated form, with the general facies of an *Arthromacra*. Smaller and narrower than the Mexican *S. brevipilis*, Champ., the head and prothorax very coarsely, confluently punctate, the latter subcylindrical, the elytra more deeply crenato-striate, with each of the interstices uniseriato-punctate, much as in *S. nigroaenea*, Champ., from the same country. *S. perforata* seems to approach the S.-American genus *Statiropsis*, Borchm., which is unknown to me.

128. **Statira pilosa**, n. sp. (Plate XIII, fig. 34, ♂.)

Elongate, narrow, rather convex, shining, thickly clothed, the legs included, with long, soft, erect or projecting, pallid hairs; piceous or rufo-piceous, with a brassy or aeneous lustre above and beneath, the antennae and legs sometimes reddish. Head short, coarsely, confluently, rugosely punctate, the eyes rather small, separated in both sexes by about the width of one of them as seen from above; antennae rather stout, thickened outwards, in ♂ about reaching the middle of the elytra, in ♀ much shorter, joint 11 in ♂ a little longer than, in ♀ not equalling, 9 and 10 united. Prothorax subquadrate, the sides slightly rounded anteriorly and feebly sinuate before the base, the transverse basal groove well defined, the margin feebly raised; very coarsely, confluently, foveolato-punctate. Elytra long, subparallel in their basal half, somewhat acuminate posteriorly; coarsely, closely crenato-striate, the interstices transversely rugulose (except near the suture), each with an irregular row of inconspicuous piligerous punctures, 4, 6, 8 smoother and subcostate. Ventral segments with scattered piligerous punctures, glabrous along the median line. Legs moderately long, the femora clavate, the tibiae roughly punctate. Aedeagus of ♂ very long, slender, acuminate, enclosed in a long, narrow sheath.

Length $7\frac{1}{2}$–11, breadth $2\frac{1}{5}$–$3\frac{1}{2}$ mm. (♂♀.)

Hab. Brazil (*Miers, in Mus. Oxon.*), Rio de Janeiro (*Fry*).

Four males and three females, varying greatly in size. The description of *S. obscura*, Mäkl., from Santa Rita, Brazil, applies to some extent to the present insect: it is, however, here assumed to have been taken from the female of a species of *Disema*. The following is an extremely closely allied form.

129. **Statira strongylioides**, n. sp.

♂. Very like *S. pilosa* and similarly coloured, but more sparsely pilose; the antennae more slender (joint 11 missing); the head sparsely, much more finely punctate, smoother between the eyes, the latter more approximate; the prothorax shorter, transversely subquadrate, the very coarse, irregularly scattered punctures reduced in number, separate one from another, the transverse basal groove uninterrupted; the elytral interstices smoother, the piligerous impressions coarser, reduced in number, and placed along 1, 3, 5, 7, and 9, those on 7 and 9 larger and more closely placed, 4, 6, 8 very little raised. Aedeagus, so far as visible, very similar to that of *S. pilosa*.

Length $8\frac{1}{2}$–10, breadth $2\frac{1}{5}$–$2\frac{9}{10}$ mm.

Hab. Brazil, Constancia and Petropolis (*J. Gray* and *H. Clark*, Jan. and Feb. 1857).

Two males, one with the femora black, except at the base. This is a form of *S. pilosa* requiring a distinctive name. The sparser vestiture is not wholly due to abrasion, but to the more scattered puncturing of portions of the surface. Both these insects, when abraded, are so like some of the smaller species of *Strongylium* (a genus of Tenebrionidae numerously represented in the same region) that they might easily be taken for such, if the dilated penultimate tarsal joint were not noticed.

130. **Statira gracilis.**

♂. *Statira gracilis*, Mäkl., Act. Soc. Fem. x, p. 646 (1875).

♂. Elongate, narrow, shining; piceous, the elytra aeneous with the suture castaneous, the antennae (except towards the tip), legs, and ventral surface ferruginous; somewhat thickly clothed, the legs included, with long, fine, erect or projecting hairs. Head broader than the prothorax, rugosely foveolate between the eyes, the latter larger, subapproximate; antennae long, rather slender, the joints becoming stouter and subserrate outwards, 11 equalling 9 and 10 united. Prothorax smooth, much longer than broad, oblongo-cordate, constricted before the raised basal margin, the transverse groove in front of it complete, deep. Elytra long, barely twice the width of the prothorax, subparallel in their basal half, acuminate posteriorly; coarsely, closely striato-punctate, the punctures becoming obsolete before the apex, the interstices narrow, transversely wrinkled, 1, 3, 5, 7, and 9 each with a scattered series of small, indistinct, setigerous impressions. Legs very long, slender, hairy, the femora clavate.

♀. Rufo-castaneous, the prothorax and elytra slightly infuscate, the latter with a faint metallic lustre; antennae shorter, more thickened outwards, joint 11 not equalling 9 and 10 united; head smaller and narrower, trifoveate between the eyes, the latter much smaller, distant; elytra gradually widened to the middle, rounded at the sides posteriorly.

Length 8–8½, breadth 2–2⅕ mm. (♂♀.)

Hab. Brazil, Petropolis (*Dr. Sahlberg*, Dec. 1850, type, ♂; *J. Gray* and *H. Clark*, Feb. 1857, ♂), Rio de Janeiro (*Fry*: ♀).

Redescribed from two males from Petropolis, and from a female taken much later by Fry, the latter almost certainly belonging to the same species. *S. gracilis* approaches *Colparthrum*, but so far as can be seen without dissection, the mandibles are not tridentate as in that genus, and the apical joint of the labial palpi is narrow.

131. **Statira haemonioides**, n. sp. (Plate XIII, fig. 35, ♂.)

Elongate, rather convex, dull above, shining beneath; testaceous, the eyes, antennae, palpi, and scutellum, the elytra with the interstices 4 and 6 for the greater part of their length, and the suture to near the tip, the under surface in part (the abdomen excepted), the tarsi, and the intermediate and posterior knees, black or piceous; the elytra with a few bristly hairs. Head alutaceous, the eyes extremely large, subcontiguous; antennae very elongate, rather stout, feebly serrate, joint 11 equalling 9 and 10 united. Prothorax wider than the head, a little longer than broad, rounded at the sides, constricted before the base, the basal margin thickened and raised; alutaceous, obsoletely canaliculate anteriorly. Elytra elongate, about one-half wider than the prothorax, slightly broader at the middle than at the base, and produced at the tip, the humeri not prominent; closely, finely crenato-striate, the interstices convex, 3 and 5 with several conspicuous setigerous impressions scattered between the base and apex, the striae arranged in pairs, obsolete at the tip. Legs very elongate, slender, simple.

Length 10½, breadth 2⅖ mm. (♂?)

Hab. Brazil, Rio de Janeiro (*Fry*).

One specimen, assumed to be ♂, on account of the very large eyes and long antennae. This insect has the general facies of a *Haemonia* (a subaquatic genus of Phytophaga not known in America from south of Mexico); it approaches the Central American *S. albolineata*, Champ., but has stouter and more distinctly serrate antennae, much larger eyes, an almost smooth prothorax, and nigro-lineate elytra. There is no trace of an opaque stigma on the elytra. *S. haemonioides* cannot be included under *Disema*, certain species of which are somewhat similar. The other described nigro-lineate *Statirae* are all very different from the present insect.

ALPHABETICAL NUMBERED LIST OF THE SPECIES OF *STATIRA* ENUMERATED IN THE PRECEDING PAGES (EXCLUDING SYNONYMS), THE NEW FORMS INDICATED BY AN ASTEKISK.

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SYNONYMS AND VARIETIES.

EXPLANATION OF PLATES XII, XIII.

[*See Explanations facing the* PLATES.]

November 24, 1917.

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PARTS II, III, IV. May 16, 1918.

THE

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OF THE

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OF

LONDON

1917.

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IX. *A Revision of the genus* Tarucus. By G. T. Bethune-Baker, F.L.S., F.Z.S.

[Read April 4th, 1917.]

Plates XIV–XX.

A year or two ago Mr. Rowland-Brown questioned me on the distinctness of the European species of the genus *Tarucus*, Moore, and my answer was that the clasping organs of the males were different, and that therefore I considered the species were distinct. This conversation led me to look up the whole matter afresh, and in doubtful cases to make more preparations of the genitalia, thus bringing to light the fact that one of the Indian or a new species occurred in Egypt and Algeria as well as the well-known and first-described species *theophrastus*, Fab.; this discovery involved a more extended research of the Indian species of this complex and very difficult little genus.

My investigations have caused me great searchings of heart, not on the distinctness of the species themselves, but rather on the questions "What is a species?" and "On what characters are we to form species?" It is quite obvious that in this genus it is scarcely possible from the pattern alone to decide, in certain cases, which is which, and yet it is equally certain that Butler's and Moore's species, which de Nicéville called so strongly into question, are quite distinct from *theophrastus*, their clasping organs are quite different, and they also are different from each other in addition to differing from that species described by Fabricius.

I have endeavoured to make a table of differences in the pattern between the species, but in vain, for whilst there is a general look that enables one to assign a name to the specimens, and as a rule the assignment is right, yet it often breaks down; for instance, I have specimens from Egypt and from Algeria that I had placed under *theophrastus*, but their clasps proved that they were in reality a new species altogether; again, specimens from Lahej (Arabia) and from India, that I had no doubt were *nara*, proved by their genitalia to be *theophrastus*. There is, of course, an explanation so far as the pattern is concerned, for Lahej and Bhuj were both dry-season specimens, and this would account for the pattern being small and but finely marked, even though the specimens themselves were of an average size. The difficulty generally occurs just with such specimens as these; localities unfortunately do not render much assistance, for if we are to rely on the determinations of observers and authors like Moore, de Nicéville, Bingham and others (and I think we can rely on them, as in some instances I have been able to confirm their identifications from my own collection), the three commonest Indian species overlap each other. The whole matter is very difficult and complex, but it shows that we must not depend entirely on pattern when dealing with closely allied species. On the other hand, I believe that in the formation of genera we ought not to completely ignore pattern, especially where there is a strong dominant arrangement of it that enables us to identify the genus of the species directly it is seen.

The genus is so closely allied to *Castalius* that reference to the species usually placed therein became necessary, and I found that in one species at least—*ananda*, de Nicéville—the genitalia led me to think that it must be included in *Tarucus*, whilst an examination of the wing scales confirmed it, for in *Castalius* there are no "battledore" scales, but in *Tarucus* they are plentiful, as they are also in *ananda*.

The distribution of the genus is interesting; in the Palaearctic region three species occur which are confined in that area to the Mediterranean subregion, two being peculiar to it; six species occur in the Ethiopian region (including Socotra therein), of which five are peculiar to it; in the Oriental region twelve species obtain, only one of them (*T. theophrastus*) occurring outside its limits, and this one is the most widely distributed of all, obtaining in each of the previously mentioned regions; the Australian region is just invaded in its Austro-Malayan or Papuan subdistrict, for on its extreme western limits a single species has been recorded from Celebes, and this, as would be premised, is peculiar to that wonderful island.

The genitalia are essentially Lycaenine, and they belong to the *Lampides* section; they have, however, certain characters that are quite peculiar, there is no "furca"—the usual "furca" is a bifurcate organ arising from the clasps near the base. In the place of this there is another organ of special design, there is also a long horn-like sclerite attached to each clasp arising from the same point, or very near the same point as the special organ just referred to, but developed in the opposite direction. These sclerites appear to me to be capable of independent movement; this, however, would not prevent combined action with the other organ should occasion arise; they lie within the hollow of the clasps just above the lower margins, and rise slightly upwards and forwards, often extending beyond their (the clasps) apices. It is difficult to believe that they can assist the clasps at all in gripping the abdomen of the female, but they might easily drop just below the abdomen and be useful as excitatory agents by tapping each side of the lower area of the sternite; they might well be called the " virgae excitatae." The special organ referred to above can be termed the " tectorius " (used for a covering); it seems to me to be different from the " anellus," being in no sense a cone-like tube, nor anything like it; it also quite differs from the " manica," and is a distinct and peculiar development that I have not hitherto met with. The " tectorius " rises from a point in the very rear of the clasps, expanding immediately hindwards (*i. e.* towards the abdomen) into two broad chitinous curtains—one on each side—lying within the cingulum; these taper more or less rapidly in different species and assume different contours. At the penal aperture the anellus becomes apparent in the shape of a solid ring, or, as in *theophrastus*, a loosely fitting tube through which the aedoeagus passes; this ring is soldered on to the lateral curtains of the tectorius, which rises slightly above the anellus, forming a small hood over it. The whole organ is capable of considerable movement fore and aft, and in the latter case can be moved right to the back of the cingulum, in which case it takes with it the aedoeagus, which is then thrown right out of its usual horizontal position into a sharply angled one. It is most probable that this organ (the tectorius) may be the persistence of a very ancient character; it is very closely similar to the cingulum or girdle, keeping the aedoeagus strictly in position, and it appears to me to be a reasonable proposition to consider it a reversion to the original structure when there were two sets of armatures, one around the anus and another protecting the sexual organs; or it may be an instance of the survival of an atavic character.

De Nicéville, when he dealt with this genus in 1890 (Butt. Ind., III, p. 187), wrote, "Omitting *T. plinius*, which is easily recognised and belongs to a different group, six forms of *T. theophrastus* have been recorded from India, and are maintained as distinct species by Mr. Butler. I am able to recognise as satisfactorily distinct two only of these forms, *T. theophrastus* and *T. venosus*." The author then goes on to record the various species in the usual way, but states definitely under each name that he regards it as a form of *theophrastus*. The very celebrated French entomologist, C. Oberthur, also records, in his incomparable "Etudes de Lepidoptérologie Comparée," fascicule iv, p. 158 *et seq.*, a similar opinion, only he goes further and treats *venosus* also as a form of *theophrastus*, and he confirms this in vol. x, p. 377. Both Bingham and Swinhoe have followed de Nicéville's lead, going further, however, in that they give as synonyms all the other species except *venosus*. I believe I wrote to my old correspondent, de Nicéville, and informed him after the publication of his third volume that both *T. balkanica* and some of the Indian species had genitalia quite different from *T. theophrastus*. I have long intended to revise the genus and the time has now come when it ought to be done, because I have no doubt at all that all the species Butler refers to will stand as entirely separate species from the European one. He (Butler), however, was not correct in his idea that *theophrastus* would turn out to be confined to Europe; it is quite a common species in many parts of India, and it occurs in Africa south of the Sahara.

The species group themselves by their genitalia into three well-marked sections, viz. the *balkanica* section, including *nara, callinara, extricatus, alteratus* and *venosus*; these all have short, broad clasps that are provided with longish, strong, horn-like sclerites; *theophrastus* will form another section; it has a long, narrow clasp, and a long aedoeagus; whilst *sybaris* and *grammica* and *quadratus* have short very broad clasps, with no horn-like sclerites, different in shape to either, but more nearly allied to *balkanica* than to *theophrastus*; the last of the three, *quadratus*, forms the connecting link with Fabricius's species in the increased length of the clasps and the long tooth at the apex.

It is interesting and curious to find that both in this genus and also in *Castalius*, the species that have been selected as the types of the genus have both long harpagones (clasps), by no means typical of the bulk of the genera, but in each case there are connecting links between them. The two genera are evidently closely related. They can, however, be separated by two characters; the species of *Tarucus* have androconia (*i. e.* battledore scales), none of the species of *Castalius* have them; there are only two or three that I have not had the opportunity of examining, and I believe I am correct in thinking that those I do not know are not likely to have these scales. The second character is the genitalia, the general form of the clasps is quite different, the aedoeagus differs also, whilst the shape and position of the cingulum and tegumen confirm the previous points; there is also no tectorius. It will be seen that my conclusions have been brought about in the first instance solely by my investigations of the genitalia; these led to the necessity of re-grouping most of the species and very many of the individual specimens, and in so doing I have discovered other species, evidently quite distinct, that had always hitherto passed under other well-known names. Under these circumstances it was manifestly advisable to confirm these points, and for this I turned to the androconial scales that are so marked a character in the males of the majority of the *Lycaeninae*; these amply confirm the correctness of each of the specific identifications I had made, and they also confirm the re-grouping of such species as *ananda* and *bowkeri*, neither of which had hitherto been included in the genus. The South African species (*bowkeri*) is, I admit, aberrant; its pattern differs from the rest of its allies in certain particulars, its clasps differ also, but the androconia are so close to *theophrastus* that I have included it with the others. In cases of this kind it appears to me to be better to do this, indicating the small divergencies, rather than to create a new genus for a single species that otherwise groups itself very naturally with its close allies.

Tarucus nara, Kollar. Plates XIV, figs. 1, 1*a*; XV, fig. 1, and XIX, fig. 19.

Lycaena nara, Kollar, Hügel's "Kaschmir," iv, pt. 2, p. 421 (1848).

The general consensus of opinion on the identification of this species seems to me to be correct; it is almost as large as *venosus*, but the primaries are more triangular and look broader at the termen. In colour it is lustrous violet with narrow dark borders. Below it is white with blackish spots, the postmedian and subterminal lines being strongly marked and but slightly interrupted at the veins, the former is sharply turned round (almost angled) at vein 6 basewards to the costa; in the secondaries the postmedian line is continuous and slightly crenulated, whilst the spots are well separated. I think it would be well to say that I know of no pattern or mark that holds true in a long series of any species in this small genus with the exception of *sybaris* and its allies; they all seem to gravitate towards *theophrastus*, whilst *theophrastus* in its dry-season forms gravitates towards one or two of the Indian species such as *callinara* or *extricatus*. I have never experienced such difficulty in separating species as I have done with these. There are only three that I have not made mistakes with even after the utmost care, and had it not been for the very distinctive genitalia of each species, I should have found it quite impossible to decide with certainty what some forms were. In diagnosing the pattern I have picked a good average specimen, but with either the dry or wet season forms the diagnosis will not be absolute. It is fortunate that the genitalia are quite distinctive, otherwise it would have been impossible to say, as we can say now, that Moore's and Butler's eyes served them well and correctly, when, without any knowledge of the reproductive organs, they described the forms they had before them as new species.

The genitalia (of *nara*) are easily separable from its near allies. The clasps are subovate with the upper margin slightly flattened, the rounded front edge being furnished throughout with a row of sharp teeth. The horn-like sclerites (virgae excitatae) are wedge-shaped, tapering to a point, and not extending beyond the apex of the clasp. The tegumen is typical of the first section of the genus, being deeply divided with only a narrow connecting ridge at the rear; the falces are shortish and stout. The aedoeagus is also fairly typical of this section, it is moderately stout, shortish, with the front portion beyond the zone suddenly reduced, and rapidly tapering to a point. The clasps are furnished with long strong bristles, and the tegumen with finer and shorter ones. The tectorius is very broad at the base, tapering at its front edge rapidly up to the anellus. The androconia are rounder and shorter and smaller than any of its allies; the apex or distal extremity being more deeply convex; there are fourteen rows of lamina with minute tubercles, the eighth row being the longest, though the row on each side runs it very close, the eighth, however, marks the summit of the convex apex; the proximal or basal portion of the scale is asymmetrical, being more rounded on one side of the foot-stalk than the other.

I should, perhaps, explain that in this genus, as generally with the *Lycaeninae*, the foot-stalks are quite straight, arising from near the centre of the androconia, and that when I refer to the proximal end or base I always mean the contour of the scale itself, not the narrow foot-stalk.

Tarucus venosus, Moore. Plates XIV, fig. 2; XV, fig. 2; XVIII and XIX, fig. 20.

T. venosus, Moore, P.Z.S. Lond. 1882, p. 245, pl. xii, ff. 6, 6*a* ♂.

With the exception of *T. balkanica*, a much smaller species, this is the darkest of the genus, and it does not appear to vary in size like the other species, its ♂ average size being about 26 mm., the ♀ being slightly larger (both *nara* and *theophrastus* reach these sizes not infrequently, but their average is certainly less); the colour of the male is dull sublustrous violaceous, with a single brown spot at the end of the cell, which is frequently almost absent in the secondaries. Moore says it has a broad marginal dusky border (the type form has the border increasing from the apex very rapidly in the primaries to a quarter of the inner margin), but this varies, and occasional specimens occur with barely more than a lineal dark border. The underside is more nearly related to *T. theophrastus* than to the others; the pattern being spotted, without lines, *i. e.* the rows of spots do not form continuous lines, the postmedian and submarginal series consisting of uniform and almost parallel rows of large spots in both wings. The Cashmire form is spotted above as is *balkanica*, but below it is typical.

The genitalia are more nearly allied to *balkanica*, but are decidedly larger and more robust. This is very noticeable in the clasps and even more so in the horn-like sclerites (virgae excitatae), which are as large again. The clasps are similar in shape, being broad and rounded on the upper edge, but being suddenly reduced and excised near the apex. The tegumen is hood-shaped, open above, except for the rounded ridge at the rear; the falces are smaller in proportion than in *balkanica*. The aedoeagus is short and broad, and is suddenly reduced at the zone (for this name see Chapman in these Transactions, 1916, pp. 158, 159), where it tapers off to a fine point with two large cornuti in the vesica. The bristles on the clasps are not plentiful and are fine, those on the tegumen equally fine but longer than usual. The tectorius is developed on the same lines as in *nara*, but is shorter, less ample, and somewhat different in outline.

The androconia are oblong, evenly rounded distally; the sides of the oblong are of unequal length owing to the proximal end of the scale being quite different on one side of the foot-stalk to the other; on the one side it is evenly rounded, the other being excised, the foot-stalk is not in the centre and thus causes one side of the base to be longer than the other. There are sixteen rows of lamina.

Tarucus waterstradti, Druce. Plate XVII, fig. 16.

Tarucus waterstradti, Druce, P.Z.S. 1895, p. 585, pl. xxxii, f. 21 ♀.

This species is described from a female, and Druce says that the upperside is very similar to the upperside of the ♀ of *T. theophrastus*, Fab.

"Underside perhaps nearest to *T. venosus*, Moore. Fore-wing: basal streak shorter and much broader, and extending down to the submedian nervure, the streak beyond broader and placed at a much greater angle, the spots beyond the middle more in line, the submarginal row distinctly separated, and the marginal row smaller. Hind-wing: a broad basal streak from just below the costal margin to the anal angle; a broad streak beyond, also from the costal to the anal margin; then a series of spots as in *T. venosus*, which are more inclined to run parallel with the streaks; then a submarginal row of large distinct spots followed by a marginal row of small spots, the three upper being simply dots, the three lower gradually increasing towards the anal angle and dusted thickly with metallic green scales. The ground-colour of both wings is slightly tinged with yellowish and all the markings are black; the cilia of both wings black.

"Kina Balu (Waterstr.). Type, Mus. Staud."

The Bornean species is evidently a close ally of *venosus*, but the unique type is not available for comparison. I have given a photographic reproduction of Druce's excellent figure in which the underside shows the pattern as well as the original drawing.

Tarucus balkanica, Freyer. Plates XIV, figs. 3–3*b*; XV, fig. 3, and XIX, figs. 21, 22.

L. balkanica, Frr., v, p. 63, pl. 421, ff. 1, 2 (1844).

♂. Deep lustrous violet, spotted with black; in the primary there is a spot closing the cell, a series of six postmedian spots, the second, third and fourth irregular and shifted outwards from the first, the fifth and sixth confluent, shifted well inwards; these occupy the same position as those on the underside, but are not merely showing through as they are definitely pigmented on the upper surface; there is also a small dark cloud in the tornus of the primary. The underside is white with the spots almost formed into lines or dashes; the postmedian line is almost crenulate and practically continuous in both wings; in the primaries it is curved to the costa from vein 6 and not infrequently is fractured at that point; the submarginal series on the primaries is prominent and generally intersected at the veins. The principal distinguishing feature is its deep violet colour with prominent black spots on the upperside.

The form from the Transcaspian region is unusually large and fine and is quite distinctive enough to be described as a local race; I propose for it the name of *T. balkanica areshana*, var. nov.

The blue though dark is much more lustrous than the form from Asia Minor or Syria, whilst the underside pattern is much more heavily marked, the postmedian and submarginal bands being more than as wide again and most commonly taking the form of broad bands, rather than rows of spots. Again, the size also is decidedly larger, my specimens of the type form measuring 21–22 mm. against the Aresh form, 26–29 mm. I have a series of a dozen specimens which were captured for me at Geok Tepe by my friend, Captain Malcolm Burr.

The species looked so different that at first I mistook it for *theophrastus*, and it is referred to again under that species.

The genitalia are usually small and slight, the clasps are broad and very suddenly excised very near the apex, which is reduced and has more or less a straight termination, finely serrated; the horny sclerites are sickle-shaped with the blade portion only moderately curved; the bristles on the clasps are long but not very numerous; the tegumen is of the usual shape, with large, strong (proportionately) falces, the bristles being fairly long, but not very numerous. The aedoeagus is short and moderately stout and has the apical portion reduced as in most other species. The tectorius is of moderate size, of the usual shape, with the anellus rather definite.

The androconia are almost oval, the sides being nearly straight, but not quite so; they are evenly rounded distally, but not quite evenly rounded proximally, possibly caused by the foot-stalk being given off somewhat away from the centre; there are fourteen rows of lamina, the sculpturing of which is rather uneven.

It is interesting to find that the androconia of the Aresh race are markedly different to those of the type form; the scale is broader proximally almost evenly oval, but increasing in width to near its distal extremity, which is evenly but slightly rounded. The foot-stalk is given off almost at the centre, and there are nineteen rows of lamina which are heavily sculptured. The naming the race *areshana* is, I think, fully confirmed by the androconia.

Tarucus callinara, Butler. Plates XIV, fig. 4; XV, fig. 4; XVIII and XIX, fig. 23.

T. callinara, Butler, Ann. and Mag. N.H., vol. xviii, p. 185 (1886).

♂. Type form. Both wings lustrous violet blue with a single dark spot closing the cell in the primaries only. Underside entirely spotted, not in lines or dashes; the postmedian and terminal series of spots are parallel and are composed of definite spots in both wings; the basal marks of the secondaries are also spots.

T. callinara nigra, forma nov.

♂. Pale, sublustrous lilac with a large dark spot closing the cell in the primaries only, beyond which are one, two, or more dark spots, smaller than in *balkanica*, but quite distinct; the marking of the underside is finer than in the type form and inclined to resolve itself more into lines, *i. e.* the spots are apt to become confluent.

This form seems to be commoner than the type. I have a series from Cutch, from Karachi and Campbellpore.

It appears to me to be probable that this species and *extricatus* have been mixed together not infrequently, as it is most difficult to separate the type form (*i. e.* the form that is not spotted on the upper surface) from *extricatus*, Butler; both species are to be found at Karachi at the same time, as also is *nara*, but whether they obtain in exactly the same locality together I have been unable to find out. I fear I could only separate the type form of *callinara* from *extricatus* by an examination of the prehensores. These in *callinara* are very close to *balkanica*.

The clasps are very similar, but are decidedly larger and broader, the sclerites are also larger and heavier in shape and are not so sharply sickle-shaped; the falces are also proportionately larger and are without the reduced apical hook; the aedoeagus is, however, narrower than in *balkanica* and slightly longer; the bristles on both the clasps and the tegumen are much finer and are less numerous. The tectorius is very ample and broad at the base and is curved round at the rear up to the anellus, frontad it is convex and is strengthened at its edge by extra thickened chitin folded over to the upper edge of the organ.

The androconia are of a long oblong shape with straightish sides, a fairly even oval base (with the foot-stalk nearly central), and but slightly curved distally; there are twelve rows of lamina, of which the sculpturing is very definite and wide apart.

Tarucus extricatus, Butler. Plates XIV, fig. 5; XV, fig. 5, and XIX, fig. 24.

T. extricatus, Butler, P.Z.S. Lond., 1886, p. 366, pl. xxxv, f. 2 ♂.

♂. The type is a diminutive specimen from Campbellpore dated "31.v.'85," the abdomen is missing, so we cannot decide the point from the genitalia.

The colour is lilac blue, of a pale tone, the pattern is composed of fine lines rather than spots; the specimen, however, is very small indeed, so that the pattern is compressed into a very small area, and would therefore almost of necessity fall into lines. The type is a dry-season specimen. Those taken in September and onwards are more violet blue, and the underside pattern, though still fine, resolves itself into spots and lunules and is less fine than in the type.

I see no reason to doubt the correctness of the general identifications of this insect; the genitalia are distinct from other species, they are small, the clasps are broad, rounded on the upper edge and slightly dentate, the lower apex being produced forward somewhat and is very slightly dentate; the horny sclerites are fine and curved; the tegumen is similar to the usual pattern, but the falces are very short and angled sharply at the rear; the aedoeagus is fine and waved with the pointed apex generally obtaining in the genus. The tectorius is very simple and of moderate dimensions.

The androconia are oblong, subovate proximally, and slightly curved distally; there are twelve rows of lamina, the sculpturing of which is rather small and well separated; the foot-stalk is given off rather out of the centre.

Tarucus alteratus, Moore. Plates XIV, fig. 6; XV, fig. 6; XVIII and XIX, fig. 25.

T. alteratus, Moore, P.Z.S. Lond., 1882, p. 245, pl. xii, ff. 4, 4*a* ♂.

♂. Upperside: the bluest of the genus with less violet than any of its allies; it is perhaps the only one that can truly be termed blue; the spot closing the cell, in the primaries only, is not very prominent, whilst the spot in the secondaries at the anal angle is distinct. The terminal dark line is linear. The underside is greyish rather than white; the pattern is small, very much broken up, the spots and dashes being rusty red; in some females this may become tawny brown.

The genitalia are distinct and large, the clasps being much the shape of a ham with the apex sharply serrate at the knuckle end; the horn-like sclerites are straight, stout and long; the bristles are long, strong and abundant; the tegumen is not so deeply divided, with rather finer and shorter bristles and with the falces large and very strong; the aedoeagus is short with the front part suddenly reduced and tapering to the tip. The tectorius is rather small, of the usual shape with the anellus very pronounced. The androconia are large and broad, somewhat ovate proximally, the base being evenly oval with the foot-stalk central; the sides are very slightly curved; the distal curve is slight also and not quite even; there are sixteen rows of lamina, the sculpturing being wide apart and very distinct.

Tarucus bengalensis, sp. nov. Plates XIV, fig. 8; XVI, fig. 8, and XIX, fig. 27.

♂. Both wings pale violet-blue tinged with lilac, the colour being solid and not showing the underside through, except to a very slight extent. Primaries with a conspicuous spot closing the cell. Terminal lines blackish. Underside very similar to *mediterraneae*, but the small series of spots just beyond the cell in both wings nearer the cell than in that species where they are close to the postmedian lines. Postmedian and submarginal lines parallel and decidedly broader than in the previous species.

Genitalia nearer to *T. alteratus*, but very different from *T. mediterraneae*, the clasps are large and are suddenly excavated in a deepish arc midway along the upper edge, from whence they extend in a broad curve to the apex, which is straightish but sharply serrated; the horn-like sclerites are very long, rather narrow at the base and tapering quickly to a fine point, they are curved the reverse way to those of the species already mentioned and extend well beyond the apex of the clasp, the bristles are fine, longish, but few in number; the tegumen is of the usual pattern, less ample and with very long falces; the aedoeagus is quite different from either of the species referred to previously, being more of the *balkanica* pattern; it is, however, decidedly longer with the apex suddenly reduced at rather more than a third from the tip, and having a shorter pointed process from the point of reduction. The tectorius is of moderate size and well developed.

Expanse 25 mm.

Hab. Calcutta.

Type in my collection.

The genitalia are so different to the nearest allies that there can be no question as to the advisability of naming the insect, even though at present it is unique.

The androconia are broadly oval, the curve distally being slightly broader than the proximal section and the sides are also somewhat rounded; there are eighteen rows of lamina, the sculpturing being fine and rather close.

Tarucus mediterraneae, sp. n. Plates XIV, figs. 7–7*b*; XVI, fig. 7; XIX, fig. 26.

♂. Upperside lilac blue, with a black bar closing the cell in the primaries only, anal spot in secondaries distinct, terminal borders very narrowly blackish. Underside, white with dark markings.

Primaries with the basal and subbasal marks as usual, but well separated; a long narrow dash from close to the costa across the end of the cell, directly below which is a broader waved dash, these are followed by a subcostal spot with a second spot projected far out between veins 5 and 6, a dash almost below the subcostal spot between veins 3 and 5; postmedian line continuous, obtusely angled between veins 5 and 6. Submarginal line consisting of a series of internervular spots. Secondaries with a basal stripe, directly below which is an inner marginal spot, a median row of four spots below each other, the two lowest of which may be confluent, a dash closing the cell, two spots below the costa generally united, three united spots projected outwards between veins 3 and 6, two united spots below the dash closing the cell, a continuous curved line just beyond these spots, followed by a series of submarginal spots with metallic blue green suffusion, the second anal spot being the most prominent.

♀. Upperside: both wings brown with whitish traces in the discal area. Underside as in the male.

Expanse, ♂ 23–26 mm; ♀ 22–23 mm.

Hab. Egypt (Alexandria); Algeria; Palestine.

Types in my collection from Alexandria.

Specimens from Cairo are paler above with finer markings below, whilst the form from Palestine is much paler above and is slightly larger also. A pair from Biskra (Algeria), collected by Eaton in 1895, are more heavily spotted below, whilst the female is well suffused with blue in the basal area of the primaries.

Lord Rothschild has in the Tring Museum a series collected in different parts of Algeria, and several hundred miles into the Sahara. I shall, however, refer to these again under the species *theophrastus*.

In Section I of the genus this species is an excellent example of the instability of pattern, specimens from Alexandria and Cairo differing to some extent, both differing more markedly from the Biskra pair, whilst these from Biskra differ quite perceptibly from those in the Tring Museum from other Algerian localities.

The genitalia are fortunately easily recognisable and differ from others of the genus; the clasps are large and broad, rapidly tapering for the apical third, the whole of this portion being sharply and deeply dentate, the apex itself consisting of two sharp teeth; the horn-like sclerites are very broad at their base, tapering narrower for two-thirds where they are angled downwards and are rapidly reduced to a fine point extending to the apex of the clasps; the bristles are longish, moderately stout, but not numerous; the tegumen is fairly large of the usual pattern with strong falces; the bristles being finer and shorter than those of the clasps; this is, however, usual; the aedoeagus is long and waved; the vesica being finely shagreened, and the tectorius ample and of the usual shape; it is, I think, the largest in the genus. The androconia are very broad, and were it not that one side of the proximal extremity is excised, it would form an evenly-shaped oblong; the foot-stalk is given off centrally; there are seventeen rows of lamina rather widely separated, whose sculpturing is somewhat small.

Section II contains three species, *T. grammica*, G.-Smith, *T. sybaris*, Hopffer, and *T. quadratus*, Grant. The first is a species from Mombasa and from Somaliland, the second a widely-spread, if local, South African insect, and the last a species from Socotra.

The genitalia in all of these lack the horn-like sclerites which are so peculiar a character of the first section; *quadratus*, however, has developed a tusk-like extension of the upper apex of the clasps, and thus forms a connecting link with Section III, containing only the type of the genus. All three species in Section II have the same type of aedoeagus as has Section I.

Tarucus grammica, Grose-Smith. Plates XIV, fig. 9, and XVI, fig. 10.

Lycaenesthes grammica, Grose-Smith, Rhop. Exot., ii, p. 102, pl. xxiii, ff. 3, 4 (1893).

♂. Both wings dark brown. Primaries with a darker spot closing the cell; secondaries with a terminal row of spots encircled with white, more prominently on the inner side. There is a trace of a similar row of spots on the termen of the primaries, but it is very obscure. Underside white with the markings of the primaries large. From the spot closing the cell in the primaries there is a short, broad dash forming an L with the cell spot; the broken series of marks outside this is united into an irregular band, very broad below vein 2; the postmedian series of spots is pushed far out, near to the subterminal series, the former being composed of fair-sized spots increasing in size towards the inner margin where they coalesce, the latter consists of six internervular smaller spots; the usual basal dash and subbasal wedge-shaped mark are present. Secondaries: a basal subcostal dash with a spot below it, followed by four short distinct dashes; a short costal and subcostal confluent mark touching the spot closing the cell, below which is another short dash; outside the cell spot are three irregular confluent spots, beyond which is the postmedian row of spots moderately evenly curved, followed by the subterminal row, some of which are slightly iridescent.

Genitalia: the clasps are very broad and are evenly curved, but if flattened somewhat wedge-shaped; the bristles are fine and not long; the tegumen is of moderate size, and the falces are small; the bristles fine and shortish; the aedoeagus is shortish, suddenly reduced all round about the middle, from whence it gradually tapers in a curve to a fine point. The tectorius is very reduced.

This is a very distinct species and was first described by Grose-Smith as *Lycaenesthes grammica* in 1893 (l.c.). In 1898 Miss Sharpe described her *louisae*, as it had not at that time been discovered that the former species had nothing to do with the genus *Lycaenesthes*; *louisae* therefore falls as a synonym to *grammica*.

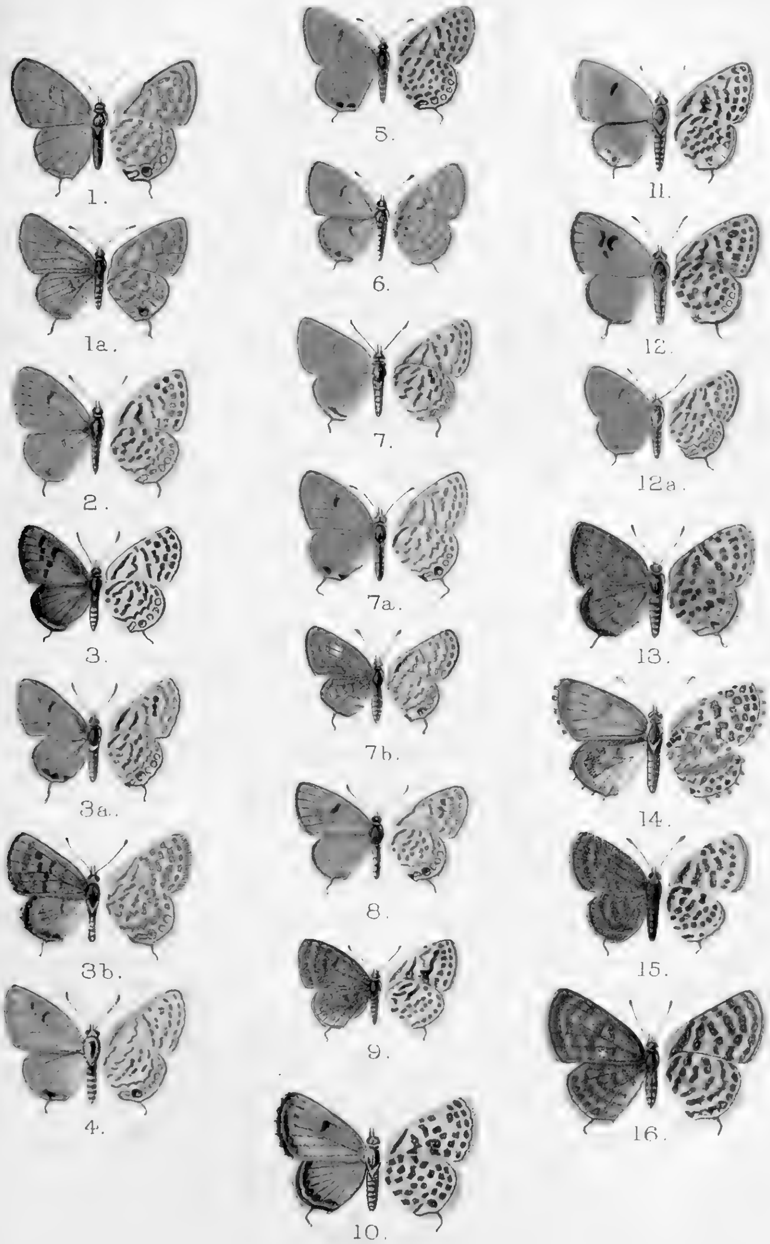
Tarucus sybaris, Hopffer. Plates XIV, fig. 10; XVI, fig. 9, and XX, fig. 28.

Lycaena sybaris, Hopff., Monats. K. Preuss. Akad. Wissensch., p. 642 (1855).

♂. Blue tinged with mauve in both wings. The primaries with a black spot closing the cell, and broadish black margins; the secondaries with a submarginal row of black spots from the anal angle to the costa, decreasing in size as they approach the costa; outside this row is a fine white line, which is succeeded by the black termen of uniform and moderately narrow width. The fringes have the basal half black and the outer half grey with a slight indication of tessellation. Underside white spotted with black, the contrast being sharper than in any other species. The primaries have the usual basal marks, the wedge-shaped mark being generally somewhat L-shaped; a large spot closes the cell with a small one between it and the costa, beyond which is another somewhat larger one between veins 6 and 9, between veins 5 and 3 are two confluent spots, and two more confluent spots further inwards are below vein 3, between 5 and 6 is a single isolated spot, shifted right out on to the postmedian curved series of six internervular spots, this being near the margin and very close to the subterminal series of internervular spots. Secondaries with three basal spots and four subbasal spots below each other; the upper two basal spots are connected to each

EXPLANATION OF PLATE XIV.

FIG.	1–1*a*.	*Tarucus*	*nara*, ♂, p. 273.
	2.	,,	*venosus*, ♂, p. 275.
	3–3*b*.	,,	*balkanica*, ♂, p. 277.
	4.	,,	*callinara*, ♂, p. 278.
	5.	,,	*extricatus*, ♂, p. 279.
	6.	,,	*alteratus*, ♂, p. 280.
	7–7*a*.	,,	*mediterraneae*, ♂, p. 281.
	7*b*.	,,	*mediterraneae*, ♀, p. 281.
	8.	,,	*bengalensis*, ♂, p. 281.
	9.	,,	*grammica*, p. 283.
	10.	,,	*sybaris*, ♂, p. 284.
	11.	,,	*quadratus*, ♂, 285.
	12–12*a*.	,,	*theophrastus*, ♂, p. 286.
	13.	,,	*ananda*, ♂, p. 289.
	14.	,,	*bowkeri*, ♂, p. 294.
	15.	,,	*dharta*, ♂, p. 291.
	16.	,,	*clathratus*, ♀, p. 293.



E. C. Knight del. et chromo. Huth imp.

THE GENUS TARUCUS.

G. T. B.-B., Photo. *André, Sleigh & Anglo, Ltd.*

GENITALIA OF THE GENUS TARUCUS.

Explanation of Plate XV.

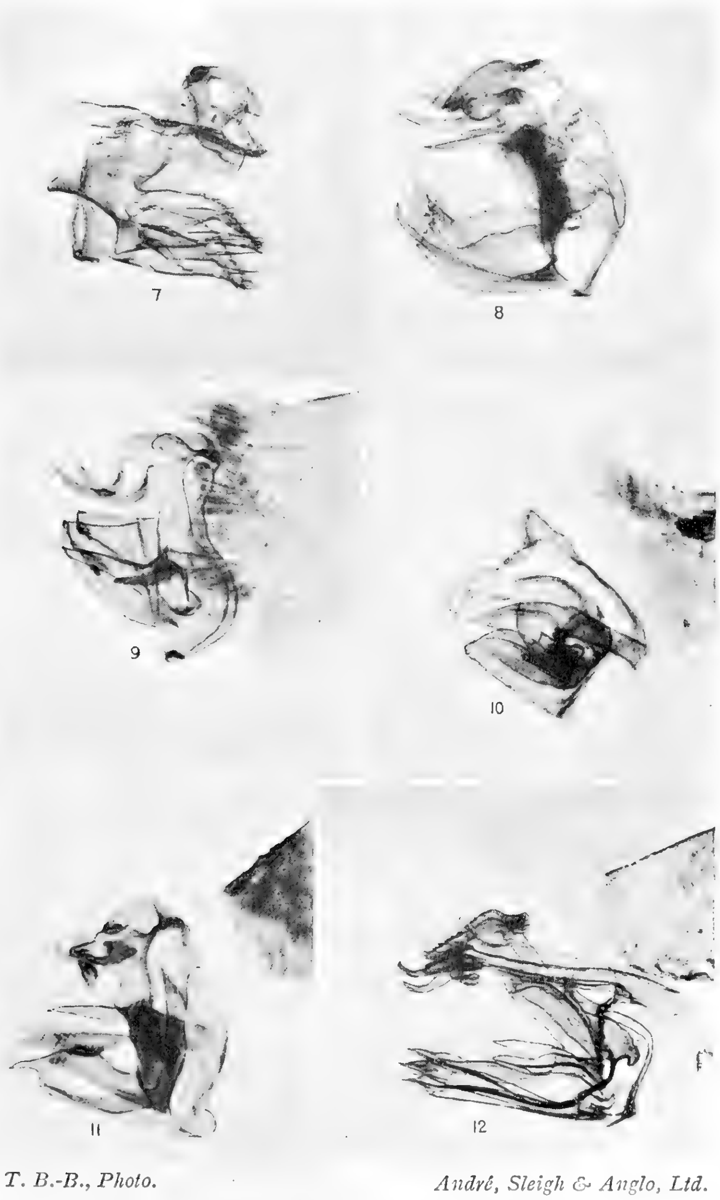
Fig. 1. *Tarucus nara*, p. 273.
2. ,, *venosus*, p. 275.
3. ,, *balkanica*, p. 277.
4. ,, *callinara*, p. 278.
5. ,, *extricatus*, p. 279.
6. ,, *alteratus*, p. 280.

The figures of the genitalia are magnified 30 diameters.

Explanation of Plate XVI.

Fig. 7. *Tarucus mediterraneae*, p. 281.
8. ,, *bengalensis*, p. 281.
9. ,, *sybaris*, p. 284.
10. ,, *grammica*, p. 283.
11. ,, *quadratus*, p. 285.
12. ,, *theophrastus*, p. 286.

The figures of the genitalia are magnified 30 diameters.



G. T. B.-B., Photo. *André, Sleigh & Anglo, Ltd.*

GENITALIA OF THE GENUS TARUCUS.

G. T. B.-B., Photo. *André, Sleigh & Anglo, Ltd.*

GENITALIA, etc., OF THE GENUS TARUCUS.

Explanation of Plate XVII.

Fig. 13. *Tarucus ananda*, p. 289.
14. ,, *dharta*, p. 291.
15. ,, *bowkeri*, p. 294.
16. ,, *waterstradti*, p. 276.
17. ,, *fasciatus*, p. 292.
18. ,, *leopardus*, p. 293.

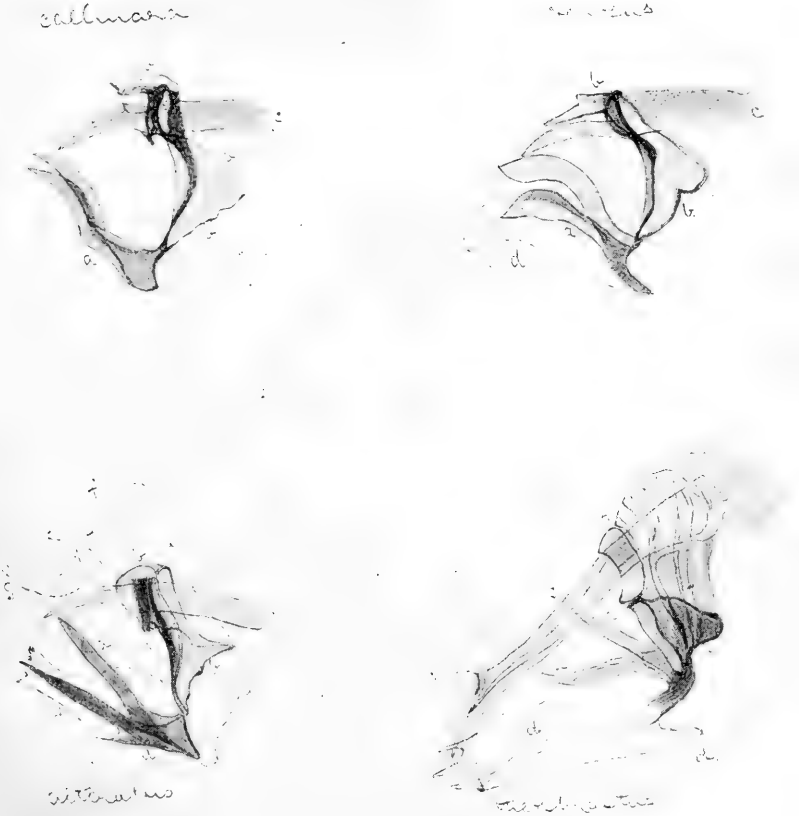
The figures of the genitalia are magnified 30 diameters.

Explanation of Plate XVIII.

Each Figure is named on the Plate.

Tarucus callinara, p. 278, upper left-hand figure.
,, *venosus*, p. 275, upper right-hand figure.
,, *alteratus*, p. 280, lower left-hand figure.
,, *theophrastus*, p. 286, lower right-hand figure.

The figures on Plate XVIII of the *virgae excitatae* and *tectorius* are magnified about 55 diameters.



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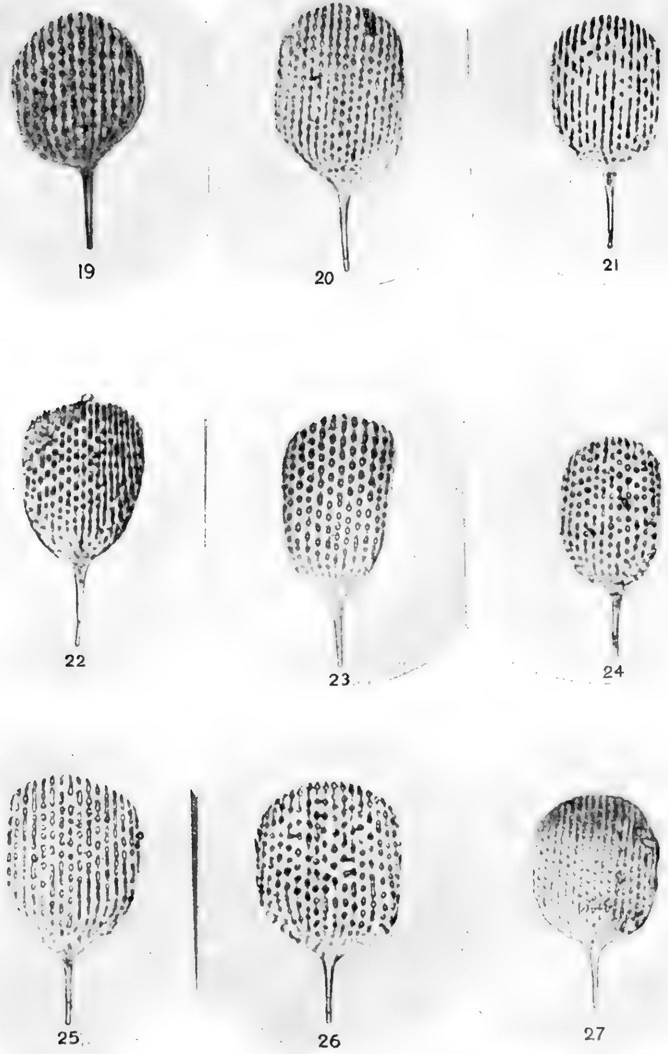
VIRGAE EXCITATAE AND TECTORIUS OF THE GENUS TARUCUS



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ANDROCONIA (Battledore Scales) OF THE GENUS TARUCUS.

Explanation of Plate XIX.

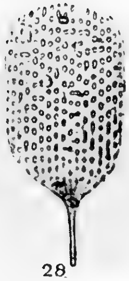
Fig. 19. *Tarucus nara*, p. 273.
20. ,, *venosus*, p. 275.
21. ,, *balkanica*, p. 277.
22. ,, *balkanica areshana*, p. 277.
23. ,, *callinara*, p. 278.
24. ,, *extricatus*, p. 279.
25. ,, *alteratus*, p. 280.
26. ,, *mediterraneae*, p. 281.
27. ,, *bengalensis*, p. 281.

The scales are magnified 500 diameters and the palpi 30 diameters.

Explanation of Plate XX.

Fig. 28. *Tarucus sybaris*, p. 284.
29. ,, *theophrastus*, p. 286.
30. ,, *ananda*, p. 289.
31. ,, *bowkeri*, p. 294.
32. ,, *theophrastus*, p. 286.
33. ,, *theophrastus*, p. 286.
34. ,, *theophrastus*, p. 286, denuded of its scales.

The scales are magnified 500 diameters and the palpi 30 diameters.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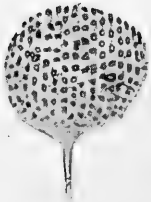
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ANDROCONIA (Battledore Scales) AND PALPI OF THE GENUS TARUCUS.

other by a fine line; a largish spot closes the cell, beyond which are three pairs of spots, two oblique ones below the costa, two similarly oblique between veins 3 and 5, and two below each other, shifted inwards between veins 3 and 1*a*; a spot shifted out close to the post-median row between veins 5 and 6; the postmedian row of eight internervular spots is strongly curved, beyond which is the sub-terminal row of seven spots, the lowest anal one being in the shape of a short dash, that and the two above have metallic blue scales superimposed.

This is also a very distinct species easily separable from any of the others.

Genitalia: the clasps are broad and wedge-shaped, but do not taper down to a point, the apex being somewhat rounded; the tegumen is deeply excavated as usual, but has lobed cheeks or sides; the falces are of moderate length and strength, and rise from just below the upper lobes. The aedoeagus is of moderate length and width, reduced suddenly at the middle by the excision of the upper half, the lower half tapering laterally to a fine point. The tectorius is developed, but slightly.

The androconia are of a long, oblong shape, with an asymmetrical ovate base, the distal extremity being very evenly curved, with the sides straight and long, the footstalk is given off from near the centre, but not centrally; there are seventeen rows of lamina, the sculpturing being smallish but very distinct.

Tarucus quadratus, Grant. Plates XIV, fig. 11; XVI, fig. 11.

Tarucus quadratus, Grant, Bull. Liverpool Mus., ii, p. 10 (1899).

The blue of this species is very similar to that of *T. sybaris* with a prominent black spot at the end of the cell in the primaries. The underside is similar in the strong contrast of the black markings on a very white ground; the pattern consists of spots, but by no means so isolated as they are in *sybaris*. The inner wedge-shaped mark at the base of the primaries is very large; the postmedian line in both wings does not consist of isolated spots as in *sybaris*, but rather of lunules intercepted by the veins; the subterminal rows of spots in both wings are composed of isolated spots, but the subbasal and median series of spots are by no means so isolated as in Hopffer's species.

The genitalia are very distinctive; the clasps are unusually broad and are somewhat excised on the upper margin near the base, as will be seen from the figure (Pl. XVI, fig. 11), after which they rise in an even curve, and at a third from the tip they taper off into a tusk-like projection at the upper apex, below which the front edge recedes and is faintly dentate to the lower apex, which is produced very slightly forwards in a dentate termination; the bristles are of moderate length and are not numerous; the tegumen is of moderate dimensions, deeply excavated to the back ridge, which is narrow; the cheeks or sides are almost lobed, and the falces are stout and of a fair length; the bristles are very fine and plentiful on the lobes; the aedoeagus is of the usual type, shortish, rather narrow, the reduction taking place near the centre, from where it gradually tapers off to the pointed apex. The tectorius is but weakly developed.

I regret I have been unable to procure specimens of this insect so as to figure the androconia, the only specimens I have been able to examine being those in the National Collection.

Tarucus theophrastus, Fabricius. Plates XIV, figs. 12, 12*a*; XVI, fig. 12; XVIII and XX, figs. 29, 32–34.

Hesperia theophrastus, Fabricius, Ent. Syst., iii, p. 281, No. 82 (1793).

If it has been difficult to give a satisfactory diagnosis of the pattern in most of the species dealt with in Section I, it is even more difficult to give one for the type species of the genus. Even Moore, whose eye for minute differences in pattern and general aspect was far more keen and critical than any one I have known, failed with this species.

The colour of the upperside may be violet blue or lilac blue. I have specimens from Souk Arras (Algeria) that are violet blue of a solid texture, and in one case it has a very large black spot, closing the cell with an angled dash beyond it. Examples from Asia Minor in my collection (exact locality unknown) may be very similar in colour to the Algerian ones, but more generally they are lilac blue and are decidedly transparent; all, however, have a prominent spot closing the cell. Bhuj (India) and Lahej (Aden) specimens are similar to the lilac ones, but with a finer mark closing the cell, whilst a pair from Senegal are of a much more delicate lilac blue, with a small spot closing the cell; in all the black termen is moderately narrow, not linear.

The underside of the Mediterranean form is usually strongly spotted, the spots being often large and very black, excluding, of course, the basal streaks, that is to say, the *spots* are generally more or less distinct in both wings. The form from Asia Minor and from India has the postmedian band in the secondaries as a series of lunules, or a more or less broad lunular band. In my specimens from Senegal the ♂ pattern is very fine, but the ♀ pattern is heavier and more like the type form.

The genitalia are totally distinct in some particulars from all others in the genus; the clasps are quite diverse, as also is the aedoeagus, whilst the parts representing, perhaps, the horn-like sclerites rest in an entirely different position. The clasps are long and of moderately even width, terminating in three tusk-like teeth, one at the lower extremity and two deeply-divided at the upper extremity; the horn-like sclerites, instead of lying along the hollow of the clasp, rise immediately from their origins at the extreme base of the clasp, and occupy a position just above its upper margin at the rear, they do not extend much beyond the centre; whilst in the first section they lie almost "perdu" in the hollow of the basal part of the clasp and rise into prominence well beyond the centre, and are always within the clasp itself, their apices only extending occasionally outside. The aedoeagus is very long, of moderately even and narrow width, tapering slightly to the apex; the vesica is echinoid in form but without the spines, it is a very delicate and beautiful object. The tegumen is very deeply divided, with narrow wedge-shaped cheeks which carry prominent falces; the bristles are fine, of moderate length and number: there are, however, very few on the clasps; the tectorius is well developed, but quite different in shape to all its allies.

At first sight it would appear that the Mediterranean specimens with heavily marked undersides would probably be *theophrastus*, but that is not really the case, and it is very far from being so with those that have a finer underside pattern. I have a series from the Caucasus that I had no doubt were this species—large, heavily-marked specimens; but the pattern was very confluent, and this impelled me to examine the genitalia; these proved quite conclusively that the species was *T. balkanica*, whilst part of a series that is in the Tring Museum from Algeria with a finer pattern, that was flying freely with *T. mediterraneae,* also proves to be *balkanica,* thus extending the range of this species in a very unexpected manner.

In the Tring Museum is a large series of specimens collected in Algeria, with a few from Egypt and Morocco. They belong to three species; *theophrastus* is the most abundant, *mediterraneae* is less so, whilst *balkanica* is much the rarest. There are in all some 477 examples, and when first I sorted and examined them I must confess to a sense of complete bewilderment so far as regards the first two; the upperside of *balkanica* marks it out fairly distinctly from the others, but it took a long study before I was able to sort out with any degree of certainty *theophrastus* and *mediterraneae,* and in the end I found the only way of coming to any satisfactory conclusion was to dissect a good number of specimens; this Lord Rothschild kindly let me do. I had considered at first that nearly all the specimens were my *mediterraneae*; the genitalia, however, proved that the great majority were *theophrastus.* At Guelt-es-Stel, in the Hautes, there are 164 of Fabricius's insect to nineteen of my new species; they were, however, flying together on the same ground and at the same time, in June, July and August, though it was in the last month that they were most abundant; at Nedroma (Oran) nine specimens of *theophrastus* only were taken; at El Kantara rather more than twice as many *theophrastus* as of *mediterraneae* occurred; at the desert post of El Hadrada ten of my species were taken and one *balkanica,* but no *theophrastus,* whilst at Ghardaia, far in the Sahara, one *theophrastus,* twenty-one *mediterraneae,* and five *balkanica* were captured, and at St. Oued Mya (Sahara) eight of the latter and a pair of *mediterraneae* were collected; the other localities yielded much the same results, except that at Biskra eleven *mediterraneae* and three *theophrastus* were taken, and at Batna there were thirteen of the latter to nine of the former. In Morocco both species occurred, from the Masser Mines only *theophrastus* was sent home, and from Zoudj-el-Beghal only *mediterraneae*; there were, however, but a few in each instance.

We see therefore, on the whole, that *mediterraneae* appears to thrive better than *theophrastus* in the desert localities and *vice versa.* The distribution of the species is so unusually interesting that I have given it somewhat in detail, though I have omitted a number of localities from where very few or only one specimen were sent home.

M. Oberthur writes me that he has *theophrastus* in considerable numbers from Biskra, Bon Saada, Djurjura and Sebdou. From the second-named locality there are two *mediterraneae* and one *theophrastus* in the Tring Museum; no doubt, taking into consideration my dissections, both species will be found in the Rennes Museum also.

After my dissections had been done, I sorted the species in accordance with those results, and they gave me a fairly easy rule of separation. I found that all my *theophrastus* dissections came from specimens in which the postmedian lines in both wings were separate spots, not confluent; in the hind-wing they were frequently more or less fine lunules, but not a continuous crenulated line; whilst in *mediterraneae* these lines were continuous, sometimes fine, but often very broad and heavy. This would, therefore, seem to be a fairly safe character whereby to separate the specimens.

I found that this was confirmed in *theophrastus* from India and other parts of Africa, in all of which the postmedian lines are composed of separate spots or lunules.

The androconia are somewhat ovate, but truncated distally into a broad arc, the proximal extremity being asymmetrically ovate with the foot-stalk given off non-centrally; there are twelve rows of lamina widely separated with the sculpturing very defined and well apart. It frequently happens that abnormal androconia are present, and I have figured one of these found on the same wing with the normal one of this species.

Tarucus ananda, de Nicéville. Plates XIV, fig. 13; XVII, fig. 13, and XX, fig. 30.

Castalius ananda, de Nicéville, Journ. A.S.B., lii, pt. 2, p. 75, pl. i, ff. 11 ♂, 11*a* ♀ (1883).

♂. Upperside deep lustrous violaceous with a distinct dark border of moderate width in each of the wings, quite markless except that the underside spots show through indistinctly. Underside, whitish with dark marks and spots. Primaries with a broad basal costal stripe, and an irregular, broad (not wedge-shaped) dash ascending to it from the inner margin, outside which is a short, very broad dash from the costa to the end of the cell; postmedian line composed of two confluent spots on the costa, a spot between veins 5 and 6 projected right out into the submarginal row, two confluent spots between veins 3 and 5 below the first two, and two confluent spots between veins 1 and 3; these are shifted inwards, and the lower spot is quite small, outside these is the submarginal, very even row of six moderate-sized internervular spots, this being roughly parallel with the terminal row of six smaller internervular spots; termen finely dark. Secondaries with a broad basal band right across the wing; four subbasal large spots below each other, the upper three more or less confluent, a spot closing the cell; postmedian series consisting of three pair of confluent spots followed by one on the inner margin, the second pair of spots is shifted outwards; submarginal row composed of seven internervular spots, the third from the costa being large on account of its coalescence with the spot projected out from the postmedian series; terminal row composed of six spots, the two anal ones having a very few superimposed blue scales that are easily rubbed off; termen finely dark.

♀. Entirely brown in both wings; a whitish cloud in the discal area, the underside discal pattern showing through. In the secondaries there is a prominent terminal row of dark spots edged inwardly with pale dashes. Underside like the male.

Genitalia: the clasps are shovel-shaped, broad, with the whole of the upper and apical margins irregularly and widely serrate, the apical margin being somewhat concave; the bristles are very fine and very few; a sclerite arises from the base of each clasp as in *theophrastus*, but is longer and stouter, extending along two-thirds of the upper margin; the cingulum is ample; the tegumen is deeply excised with long, strong falces; the bristles are more numerous than on the clasps, but are very fine; the aedoeagus is moderately long, stout, and tapering to a fine tip near the apex; it is provided with two long sclerites, lying internally, one on each side, the vesica is furnished with two rather long hairy brush-like processes—like a fox's tail—which are capable of inflation and then assume an almost spherical shape; the tectorius is small, being reduced to a broad column thrown right back in the rear of the clasps. The androconia are proximally asymmetrically ovate with the foot-stalk given off slightly sideways; the sides are very slightly curved; the distal extremity being slightly and evenly convex; there are sixteen or seventeen closely placed lamina whose sculpturing is irregular and rather small.

This well-known Indian species is easily recognised from all its neighbours but one, for here also I have found two species mixed together that have revealed themselves by their sexual organs.

I have placed these species in the type section on account of the position of the sclerites that replace the "virgae excitatae," and on account of the aedoeagus and reduced tectorius.

Tarucus dharta, sp. nov. Plates XIV, fig. 15; XVII, fig. 14.

♂. Upperside sublustrous violaceous with brown borders to each wing of moderate width. Underside whitish with brown markings. Primaries with a broad costal band and a broad erect subbasal dash (not wedge-shaped), both much shorter than in *T. ananda* and more separate; a broad dash across the end of the cell surmounted by a spot shifted somewhat outwards; postmedian line consisting of three pair of confluent spots and a single one shifted well outwards, but not touching the submarginal series; the second pair of spots is shifted slightly outwards and the third pair well inwards; submarginal row composed of six fair-sized internervular spots followed by the terminal row of six internervular dashes; termen finely dark. Secondaries with a broad basal dash, followed by four largish spots below each other, the uppermost costal spot being very large; these spots are almost confluent; a reniform mark closes the cell; postmedian series composed of a pair of confluent subcostal spots, three confluent spots shifted outwards and almost forming a broad dash, a pair of confluent spots shifted inwards under the reniform spot; postmedian row composed of eight interneural spots followed by a trace of a terminal row of dashes represented by three fine interneural dashes at the apex and two spots at the anal angle; termen finely dark.

♀. Both wings brownish with whitish discal areas and most of the underside pattern showing through. Primaries irrorated on the fold and the discal area with brilliant lustrous blue, and the postmedian row of spots showing prominently through. Secondaries with a trace of the blue in the discal area, and a fine series of whitish interneural dashes outside the postmedian row of spots showing through. Underside precisely like the male.

Expanse, ♂ 25; ♀ 26 mm.

Hab. Sikkim, Darjeeling.

Types in my collection.

This species may be recognised from *ananda* in the greater separation of the underside pattern throughout, and especially in the submarginal and terminal lines; the female is markedly different.

Genitalia: the clasps are of moderate size, broad at the rear, but tapering gradually to the apex and terminating in a rounded extremity; the "virgae excitatae" are replaced by a peculiar structure, and is for nearly two-thirds of the basal portion a portion of the lower margin of the clasps, then it suddenly develops into a longish narrow rod which extends well beyond the end of the clasp; the cingulum is narrow, increasing in width as it approaches the tegumen, which is of moderate size, deeply excavated with fairly developed falces; the aedoeagus is peculiar of moderate size at the rear behind the zone, but for the apical two-thirds it is very narrow indeed, and tapers gradually into a fine point; the tectorius is reduced, thrown right behind the clasps, as in the previous species, having no hood, but being of a different structure, and in a different position from the furca.

There remain four other descriptions to be considered, *Tarucus* (*Plebeius*) *fasciatus*, Röber, from Banka, *Tarucus leopardus*, Schultze, from the Philippines, *Tarucus clathratus*, Holland, from Celebes, *Tarucus fluvialis*, G.-Smith, also from Celebes. These form a small section wherein the spotted pattern is transformed almost entirely into a "banded" pattern, the spots having become confluent so as to form broad definite bands across the wings, thus making them separable at a glance from any others of the genus.

Tarucus fasciatus, Röber. Plate XVII, fig. 17.

Plebeius fasciatus, Röber, Ent. Ver., "Iris," i, p. 194, pl. ix, f. 15 (1887).

Röber describes the species (freely translated) as follows:—

"♀. Upperside smoky grey with the median area of all the wings whitish, the basal area being weakly irrorated with light blue; at the termen of the hind-wings the black border spots of the underside show through; hind-wings with a white terminal line, shortly tailed at vein 2 (M^1). Underside yellowish white with blackish grey bands, and terminal rows of spots.

"Expanse, 27 mm."

Hab. Banka Island (*H. Kuhn*).

There is an excellent photograph of the insect ("Iris," 1887, pl. 9, f. 15, p. 194), so sharp and defined in all particulars that there can be no difficulty in identifying the species. I give a reproduction of it on Pl. XVII, fig. 17.

Tarucus clathratus, Holland. Plate XIV, fig. 16 ♀.

T. clathratus, Holland, Proc. Bost. Soc., xxv, p. 71, pl. 5, f. 8 (1891).

Holland describes his species thus :—

"Near *T.* (*Plebeius*) *fasciatus,* Roeber ('Iris,' vol. i, p. 194), but smaller and differently marked. The upperside of the wings is lilac, with smoky grey margins. The black markings of the underside are distinctly visible from the upperside. In *fasciatus* the submarginal black line is narrow, in *clathratus* it is broad. In the former the two succeeding black lines are distinct throughout; in the latter they unite, forming a rude figure of the letter Y. There are many other minor differences which readily reveal themselves upon a comparison of the two species, and which are more easily seen than described. The type, a male, is in my collection."

The habitat is Celebes, and I quite concur in Dr. Holland's opinion that his species is distinct from Röber's. I have no doubt, however, that Grose-Smith's *T. fluvialis* is the female of Holland's *clathratus.* Smith gives a long and careful description of his species, a female, which also comes from Celebes, saying that it is nearest to *T. fasciatus,* Röber, but that the arrangement of the bands on the underside is quite different, and then he goes on to say that "it may not improbably be the female of *T. clathratus,* Holland, but that his figure is so diminished that it is impossible to decide with certainty whether this is the case." I have enlarged Holland's figure, and find that the pattern is precisely the same below, only in the original, being a male, the bands are narrower than in the Tring type. The underside shows through in just the same manner, and I do not think there can be any doubt as to the identity of the two insects.

Tarucus leopardus, Schultze. Plate XVII, fig. 18.

T. leopardus, Schultze, Philippine J. Sci. D., 5, p. 161, pl. 1, f. 9 (1910).

The species was described in the Philippine Journal of Science. The following is a copy of the description :—

"♂. Upperside of wings iridescent, purplish blue with a narrow dull black line along outer margin; cilia white. Tail black, tipped with white. Hind-wing with two indistinct submarginal spots at posterior angle. Underside of wings white with a faint ochraceous tinge and numerous dark brown markings as follows: a narrow subcostal band from base to middle of fore-wing, thence obliquely toward posterior outer angle; basal area with three triangular patches, the medial one being most prominent; outer area with three oblique bars from the costa; the second, which is the longest, reaching vein IV; a prominent, nearly round, postmedial spot between veins III and IV; a submarginal band and a marginal row of six very small spots, each between two veins, and a very fine marginal line. Cilia white. Hind-wing with a basal bar, six antemedial transverse streaks, two medial transverse streaks, two postmedial streaks, and a postmedial band from inner margin to vein VI; a prominent submarginal band, six submarginal spots and a fine anteciliary line. The submarginal area between veins I and III is dark ochraceous, and the two black spots upon it are surrounded by a highly metallic, green line.

"♀. Upperside of wings grayish brown with a bluish iridescence on basal half. Discal area whitish. All markings on underside similar to those above, although less diffused. Hind-wing with the submarginal row of spots large and distinct. Underside similar to that in ♂; all markings somewhat larger.

"Length of wing, ♂ 11 millimeters; ♀ 13·5 millimeters.

"Luzon, Province of Camarines, Paracale, P.I. (J. P. Iddings collector). Type ♂, ♀ and co-type No. 12743 in Entomological Collection, Bureau of Science, Manila, P.I."

From the figure referred to, which I reproduce on Pl. XVII, fig. 18, I believe that this species is allied to *clathratus*, Holland.

This brings us to the last two species of the group, that I should perhaps have hesitated to include in the genus. The pattern is different, but the androconia have quite the same shapes and facies, and the genitalia have the remarkable form of the "tectorius" strongly developed, but modified; they are, therefore, better placed here than elsewhere, at least, for the time being. Trimen himself indicated an alliance between them and *sybaris*.

Tarucus bowkeri, Trimen. Plates XIV, fig. 14; XVII, fig. 15; XX, fig. 31.

Lycaena bowkeri, Trimen, Trans. Ent. Soc. Lond., 1883, p. 351.

♂. Both wings on the upperside are lustrous pale violet blue. Primaries with a dark indefinite spot closing the cell, with a broad black termen and black and white tessellated fringe. Secondaries with an indefinite spot closing the cell, a very oblique row of dark postmedian spots and a complete row of dark submarginal spots, both these rows occupying the position of the underside pattern, but not being merely the showing through of that pattern; a terminal series of dark spots merging into the black termen around the apex; fringes white with black tessellations at the ends of the veins. Underside white with ash brown spots. Primaries with the subcostal basal stripe, a spot in the middle of the cell with two other spots below it, representing the usual wedge-shaped mark; a good-sized spot closing the cell with one or two above it, beyond which are three very oblique spots from the costa, with two confluent ones below the lowest of the three, but shifted inwards; two confluent squarish spots almost below the one closing the cell, a series of six interneural submarginal marks followed by a terminal row of six distinct spots; termen consisting of fine black dashes intersected with white interneurally. Secondaries: a costal basal spot below which is the basal stripe which is very irregular, four subbasal spots below each other with another small spot from the second connecting it with the spot closing the cell; postmedian series (composed of eight spots) widely separated between the second and the third spots, the lower six forming a very oblique row from vein 6 to the inner margin; all the spots hitherto referred to in the secondary are somewhat darkly encircled; submarginal row of seven marks very irregular; terminal row composed of seven distinct spots, the first above the apex very small; termen with dark dashes intersected with white interneurally.

Genitalia: these organs are very large indeed when compared with those of the rest of the genus; the clasps are long, very broad at the base, but taper rapidly to a narrowish rounded extremity; the cingulum is of moderate and even width; the tegumen rather small and less excised proportionately; the falces are highly developed, being deeply curved and longish, but of only moderate width; the aedoeagus is of moderate size, broad and slightly increasing in width to the zone, from whence it gradually tapers for two-thirds of the remaining length; the apical third tapering very rapidly to a sharp point; the tectorius is ample and well developed, being somewhat of the *theophrastus* type, but much more ample basally. The androconia are very similar to those in *theophrastus*, but somewhat larger altogether, they have thirteen rows of lamina that are sculptured rather more finely than in Fabricius's species.

Tarucus thespis, L.

Papilio thespis, Linnaeus, Mus. Ind. Ner., p. 318, N. 136 (1764); *id.* Syst. Nat., p. 791, N. 236 (1767).

This species is very close to *T. bowkeri*, but differs in the following particulars. It is of a decidedly brighter and clearer blue on the upperside, and has quite narrow almost linear black borders, the fringes are longer and more definitely tessellated; it has not in the secondaries a terminal row of spots as obtains in *bowkeri*. On the underside the predominant colour is brown, not whitish as in Trimen's insect. The markings are similar, but decidedly larger and the terminal row of spots, well marked in *bowkeri*, is lacking in *thespis*. In the primaries the fold and inner marginal area is entirely brown, except for quite a small whitish patch at the tornus; the tail is little more than a dentition in the fringe.

The ♀ is almost entirely brown above in both wings with no white areas, as in *bowkeri*, but with a slight, restricted, basal blue suffusion, which, in the secondaries, extends to the inner marginal area; a small white spot edges exteriorly the spot closing the cell and has three or sometimes two white spots beyond it.

It occurs in Cape Colony, where it is widely distributed over the eastern and western districts, and has also been recorded from Natal.

The genitalia are of the same type as *bowkeri*, the clasps being large and long, but easily differentiated. The tegumen is distinctly different; it is much smaller, with a very narrow apex, and very much smaller and slenderer side lobes, whilst the falces are longer and much more slender; the aedoeagus originates of moderate size, but very rapidly widens up to the zone, where it is suddenly excised and tapers more gradually to a point, this front portion being half as long again as the rear part. The vesica is a beautiful object, its orifice being elegantly trumpet-shaped, and being very finely shagreened all over; the virgae excitatae are absent, but the tectorius is developed in a modified form, somewhat as in *bowkeri*.

Explanation of Plates XIV–XX.

[*See Explanation facing the* Plates.]

X. *Notes on some British Guiana* Hymenoptera (*exclusive of the* Formicidae). By G. E. Bodkin, B.A., Dip. Agric. (Cantab.), F.Z.S., F.E.S., Government Economic Biologist, Department of Science and Agriculture, British Guiana.

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[Read December 6th, 1916.]

Plates XXI–XXIII and Sketch Map.

Up to the present time very little has been known of the habits and life-histories of the *Hymenoptera* of British Guiana. Schomburgk,* in his "Fauna and Flora of British Guiana," devotes six pages to the *Hymenoptera* and gives a few observations with regard to their biology as observed by himself, but unfortunately many of the scientific names are quite impossible to trace. Peter Cameron has published in "Timehri" † a comprehensive list of the *Hymenoptera* of this country, with descriptions of many new species, but no biological notes are attached. Scattered references have appeared from time to time in many scientific publications, but the majority of these are descriptions of new species.

The present collection in this laboratory was commenced in 1911 and has been formed chiefly by myself as opportunities have occurred. All the commoner species have now been collected, and in many cases observations made on their life-histories and habits. The accompanying map indicates in red dots the areas where collections and observations have been made. These necessarily follow

* Schomburgk, R., "Fauna und Flora von British Guiana." Leipzig, 1848.

† Peter Cameron, Hymenoptera of the Georgetown Museum, "Timehri." Journal of the Royal Agricultural and Commercial Society, 1911–12. Pt. 1. Parasitica, I, pp. 153–186 (1911). Pt. 2. Parasitica, I, pp. 306–330 (1911). Pt. 3. Marabuntas or Wasps, II, pp. 207–231 (1912). Pt. 4. Fossores, II, pp. 412–440 (1912).

the chief communication routes either by water, road, or trail. Vast areas consequently remain untouched.

The collection at present contains 1,600 specimens, of which 161 species are named. All these identifications have been made either by specialists in the British Museum, through the co-operation of the Imperial Bureau of Entomology, or by specialists in the U.S. National Museum.

The present work clearly shows that in scope it can hardly pretend to do more than outline the vast field which awaits entomologists in this part of the world.

There is a distinct difference between the *Hymenoptera* of the flat, cultivated and inhabited coast lands and those of the forest-clad area. Many species of common occurrence on the coast lands are never found in the forests, and *vice versa*. The climate of these two areas also varies, the interior districts having a higher rainfall and a somewhat higher temperature. The trade-winds which sweep the coast lands most of the year are not experienced to any extent inland. No opportunity has yet occurred to investigate the large tracts of savannah lands which exist at the back of the Colony near the Brazilian frontier.

The observations on the habits and life-histories are mostly my own, but a number of interesting notes by the following gentlemen must be acknowledged: Mr. C. B. Williams, Mr. L. D. Cleare, Jnr., Mr. H. W. B. Moore, and Mr. A. A. Abraham.

I have endeavoured to give as full information as possible concerning each species. Where only one specimen of a species has been collected I have given the locality of collection.

The Ants have not been included in these notes, as Mr. W. C. Crawley has already published * an account of the Family.

Family APIDAE.

Subfamily *SPHECODINAE.*

Genus Temnosoma, Smith.

T. aeruginosum, Smith. Issororo, N.W.D.

* "Ants from British Guiana," W. C. Crawley, B.A. Annals and Magazine of Natural History, Ser. 8, vol. xvii, May, 1916.

Subfamily *ANDRENINAE.*

Genus Augochlora, Smith.

A. graminea, F.
A. thalia, Smith.
A. calypso, Sm. } Taken while feeding on flowers of "wouralli" (fish-poison plant), Issororo, N.W.D.

Subfamily *PANURGINAE.*

Genus Megalopta, Smith.

M. sodalis, Vachal. Issororo, N.W.D. This species is frequently attracted to artificial light.

Subfamily *XYLOCOPINAE.*

Genus Xylocopa, L.

X. fimbriata, F. The commonest wood-boring bee in British Guiana. The female is black and the male an ochreous yellow with green eyes. The proportion of females is greater than males—about 4 to 1. Both sexes may frequently be seen collecting honey from a number of commonly occurring flowers, especially those of the large red *Hibiscus* and the flowers of the Pigeon Pea. It possesses a powerful sting, and the flight is accompanied by a loud buzzing sound. I have never observed the species in the interior. Any dry decaying wood is utilised for nesting purposes, such as rotten paling-posts or tree-stumps. The softer kinds of wood are preferred. Logs of wood infested by these bees soon become literally riddled with their borings, and large quantities of frass may be seen piled up at the foot of the log. If such a log is sharply tapped a shrill buzzing noise may be heard caused by the contained bees. A log of wood 5 feet long by 2 feet in diameter on being split open was found to contain 20 imagos and 25–30 larvae and pupae. There were about three entrance holes, and these led directly into galleries bored at right angles to the grain of the wood. In such galleries the cells are formed, usually three or four together, never more. Each cell is about an inch in length and about $\frac{3}{4}$ inch in diameter. The cells are separated from one another by a partition or "wad" of sawdust cemented together and hardened by the bee. These partitions are $\frac{1}{4}$ inch in thickness. The galleries and cells are perfectly smooth and very neatly executed. Each cell is stocked with a small, fairly solid mass consisting apparently of a mixture of honey and pollen. It is a dark yellow in colour with a peculiar though not unpleasant odour. These masses of foodstuff weigh about 2·5 grammes, and an equal quantity is deposited in each cell. On this mass the egg is finally deposited and gradually increases in size as development proceeds; later, the segmentation of the future larva may dimly be perceived through the enveloping shell. It is sausage-shaped, slightly curved, and almost transparent in the earlier stages. Length 1·7 cm., diameter 0·4 cm. During development one end becomes somewhat larger than the other. Eventually the extremely thin pellicule strips off and the wrinkled larva is exposed, which starts feeding immediately. The larval excrement is hard, and formed in short rods black in colour. The full-grown larva measures 3·9 cm. in length, and is creamy white in colour. The larval stage lasts about three weeks. Gradually the outlines of the pupa may be seen through the larval skin, which eventually peels off. The period between the full-fed larva and the final stripping of the larval skin is 48 hours. The pupa is at first creamy white, and in form roughly resembles the future adult insect. Length of pupa 2·5 cm., breadth 1·4 cm. Within the first week of pupation a general darkening of colour takes place, the eyes going almost black; hardening of the integument occurs simultaneously. These two processes progress rapidly till the perfect insect is formed in about 3 weeks. It then makes its exit from the cell by gnawing away the wad of hardened sawdust.

X. barbata, F. A fairly common species on the coast lands.

X. brasilianorum, F. A not uncommon species within the forest area. Rockstone, Essequebo River, and H.M. Penal Settlement, Mazaruni River.

X. aurulenta, F. An uncommon species within the forest area. Rockstone, Essequebo River.

Subfamily *PROSOPIDINAE.*

Genus Caupolicana, Spinola.

C. eximia, Smith. Essequebo River, in vicinity of Rockstone.

Subfamily *ANTHOPHORINAE.*

Genus Eucera, Scopoli.

E. festiva, Sm. Vicinity of Georgetown.

Genus Exomalopsis, Spinola.

E. globosa, F. Botanic Gardens, Georgetown.

Genus Epicharis, Klug.

E. rustica, Oliv. Rockstone, Essequebo River.

Genus Melitoma, Latr.

M. euglossoides, Lep. From cultivated Cotton blossoms, Georgetown. This bee has a curious habit of clinging to the edges of blades of Para grass, with its mandibles firmly embedded in the tissues. The reason for this is not apparent. They remain quite motionless in this position, and at times may be seen in considerable numbers. Fairly common about coast lands.

Genus Centris, F.

C. longimana, Lep. A common species both on the coast lands and in the interior. It is attracted to strong-smelling substances such as salt fish, and will follow boats with this substance on board for long distances up the rivers. Frequently seen about buoys moored in the centre of the tidal passages in the big rivers and elsewhere. It is apparently attracted there by the excreta dropped by sea-birds on these objects. It has a swift, noisy flight.

C. lanipes, F. Fairly common on the coast lands and in the interior. Has been taken at flowers and also in the act of collecting soft mud from a pathway.

C. versicolor, F. Taken on one occasion while attracted to artificial light. Appears to occur only in the interior.

C. personata, Sm. It has similar habits to *C. longimana*, Lep. Taken under similar conditions in the North-west District.

C. labrosa, Friese. An uncommon species. H.M. Penal Settlement, Mazaruni River.

Genus Thygater, Holmb.

T. rubricata, Sm. Rockstone, Essequebo River.

Genus Euglossa, Latr.

E. dimidiata, F. A fairly common species in most parts of the Colony. Observed on several occasions to collect mud from a pathway. A somewhat clumsy insect, easy to capture, but when alarmed assumes a rapid flight. Frequently observed flying about and alighting upon the bark of certain trees, though on closely inspecting the bark no feature which might attract the bee could be observed.

E. cordata, F. The commonest *Euglossa* in British Guiana. Observed in all areas visited. It will construct its somewhat sticky nest in all sorts of curious places, such as the inside of a disused reel of cotton, interior of empty cartridge case, eye-piece of polariscope, keyholes, small cavities in timber, etc. It also takes over the disused cells of *Sceliphron fistulare*, Dahlb. In the forest areas I have observed this bee to construct its nest on the under surface of a leaf. The nest varies in the number of its cells, some only containing two or three, others as many as six. The cells are roughly about 1 cm. in length and about 5 mm. in breadth, with the ends neatly rounded. Each cell is stored with a viscid mixture of honey and pollen, on which the larva feeds. The walls of the cells are thin and soft, being constructed of some dark vegetable substance. The whole exterior is sticky. This insect has an extremely rapid, darting flight, and is particularly fond of the white, sweet-smelling flowers of a certain species of prickly wild Solanaceous plant. While the bee is within the white blossoms it emits an exceedingly shrill buzzing sound, which is often difficult to locate.

E. surinamensis, L. Another very common species of *Euglossa* throughout British Guiana. It is greatly attracted to the flowers of the same Solanaceous plant as attracts *E. cordata*, L. Its loud buzzing and somewhat slow flight makes its presence conspicuous. The nest is constructed sometimes in artificial holes in timber, in cavities in the trunks of trees, and at times on the top of roof-beams. The substance of the nest is thin flakes of bark, or sometimes flakes of white plaster from houses, exceedingly strongly cemented together. Several cells are usually formed united in an irregular mass. Each cell is stored up with a quantity of honey and pollen of moderately hard consistency. The cells are about 1·5 cm. in length, with a diameter of about 1 cm., ovoid in shape, with a perfectly smooth lining.

E. nigrita, Lep. Not a particularly common species. So far only observed on the coast lands. On one occasion the bees were observed to be nesting within a hollow beam in the large dining-hall of one of the largest hotels in

Georgetown. The bees passed to and fro, apparently quite regardless of the proximity of human beings.

E. piliventris, Guér. An uncommon species from Upper Essequebo River. Attracted to flowers of the wild Solanaceous plant previously mentioned.

E. analis, Lep. An uncommon species. A large nest consisting of many ovoid cells was once taken from the soil on the East Coast of Demerara. The cells were hard, dark in colour, and joined together. Only one bee hatched from this nest.

E. cayennensis, Lep. (= *fasciata*, Lep.). A fairly common and widely distributed species throughout the Colony. Nesting habits not observed.

E. decorata, Sm. An uncommon species from the interior. Essequebo River.

Genus Exaerete, Hoffm.

E. smaragdina, Guér. A common species in some parts of the interior, especially the N.W.D. All of my specimens were collected while flying about piles of cordwood from which a strong-smelling sap was exuding, and on which the bees were feeding. Occasionally seen on the coast lands and in the Botanic Gardens, Georgetown. Nesting habits unobserved.

Subfamily *MEGACHILINAE.*

Genus Megachile, Latr.

M. lobitarsis, Smith. An uncommon species with a wide distribution.

M. lanata, F. This insect has only once been collected, and that beneath the Government Laboratory, Georgetown. The mud cells were situated within a disused $\frac{3}{4}$-inch iron pipe. The nest was cylindrical in shape and contained about four cells. The nest was very firmly cemented together, making the whole structure exceedingly strong and hard to break. This bee is well known in India.*

Subfamily *COELIOXYNAE.*

Genus Coelioxys, Latreille.

C. simillima, Smith. Apparently a widely distributed though not common species. Nest observed in cylindrical borings in a wooden post.

* Lefroy, H. Maxwell, "Indian Insect Life," p. 219.

Subfamily *BOMBINAE*.

Genus Bombus, Latr.

B. cayennensis, F. A common species found only in the interior.

Genus Melipona, Ill.

M. interrupta, Latr. This species is widely distributed and common. The specimens in the collection were all taken while they were collecting soft mud from paths.

M. pallida, Latr. A fairly common species in the interior. A small nest on one occasion observed in a rotten log of timber with a small circular hole formed of wax for exit. When the nest is disturbed they swarm out and attack by biting the exposed parts of the head and neck, emitting at the same time a shrill buzzing sound. These small bees possess a peculiar odour which is characteristic.

M. favosa, F. A common species on the coast lands, where it is known as the Courida Bee, from a supposed habit of collecting honey from the flowers of the maritime Courida (*Avicennia nitida*). The nests are found in hollow trees, etc., especially in old Courida trees, but they have been found in disused drain-pipes and other unlikely places. This bee possesses no sting, and I have never observed it to attack in any way; when the nest is disturbed the bees swarm out, but do not demonstrate their resentment in any more practical manner. This bee is frequently domesticated, and when the nests are found in the field they are removed, taken home, and put in wooden boxes with a small exit hole. They thrive in captivity. The honey which they produce is thin and of a somewhat insipid flavour; mixed with other ingredients it is utilised by the natives as a cure for cold in the throat or chest. The honey is stored in egg-shaped cells constructed of wax, about $1\frac{1}{2}$–2 inches in length; similar cells are also constructed containing nothing but wax. The cells containing the larvae are 8 mm. in length and about 5 mm. in breadth.

M. clavipes, F. A common species in most parts of the Colony. The nests are usually constructed in hollow decaying logs. The following notes on the nesting habits of this species were made from a nest which was found in a hollow log of Trysil wood (*Pentaclethra filamentosa*). The extreme length of the hollowed-out portion containing the nest was 32 inches. Three distinct layers of various kinds of cells were observed on splitting open the log longitudinally. The layer next to the entrance consisted of wax cells about $\frac{1}{2}$ inch in length and $\frac{3}{8}$ inch in diameter; ovate in shape. The length of this layer was 8 inches. These wax cells were yellowish in colour and contained solid wax. To the taste the wax had an exceedingly bitter flavour, and a sour smell which seemed to pervade the whole nest. The layer next to the wax cells contained honey cells; this layer was 9 inches in length. The cells themselves were slightly smaller than the wax cells, same shape and dark brown in colour. The contained honey was thick, very sweet and possessed quite a good flavour, but if the slightest trace of the wax coating of the cell got mixed with the honey the bitterness of the wax entirely obliterated the pleasant flavour of the honey. The next layer consisted of the cells with embryonic bees in various stages of development; it was 9 inches in length. These cells were about $\frac{1}{8}$ inch in length and dull yellow in colour. In shape they were cylindrical. Apparently the nest was entirely enclosed, with the exception of the exit. This exit was by no means a conspicuous object, as it was constructed of wax much the same colour and texture as the surrounding bark. It was slightly raised above the surface of the bark, and roughly cone-shaped with a very small exit hole. Attention was drawn to the presence of this nest by the bees hovering around the exit. This species is by no means so pugnacious as some of the other species of *Melipona*.

M. recurva, Sm. An uncommon species from the N.W. District.

M. lineata, Lep. Bartica, Essequebo River.

M. flavipennis, Sm. Taken on one occasion while attending flowers of Guava.

M. varia, Lep. A nest of this species observed in a large greenheart beam supporting the hotel at Rockstone, Essequebo River. A non-pugnacious species. The entrance to the nest is funnel-shaped and constructed of wax.

M. guianae, Ckll. A most pugnacious species. If the nest is only slightly disturbed the bees swarm out and attack the intruder by biting the exposed parts of the head and neck, at the same time emitting a shrill buzzing. The nests (which are large) are usually constructed in the branches of trees at some distance from the ground. The bees possess a peculiar smell, due to the character of the substance which they collect on their hind-legs. A large nest observed on one occasion on the branches of a Pimento tree (*Pimenta officinalis*).

M. rufiventris, Lep., var. *flavolineata*, Friese. Tumatumari, Essequebo River.

Melipona amalthea, F. A common and widely distributed species. May be observed on the blossoms of most garden plants, and is particularly fond of feeding on over-ripe fruit. It may also frequently be seen collecting mud from damp paths, creeks, etc. Known locally as "Tarbaby bees." It has a habit of collecting the scrap-rubber from recently tapped trees of *Hevea brasiliensis*.

M. rufiventris, Lep. Rockstone, Essequebo River.

M. dallatorreana, Friese. East Coast, Demerara.

M. mutata, Lep. Upper Demerara River.

Genus Apis, Linn.

A. mellifera, L. Only a small number of hives of the domestic bee are kept in the Colony, and these are principally owned by the Chinese and Portuguese. The honey produced is of good quality and very sweet. Fresh stock is usually imported from the United States. They are mostly "Italian bees." The Wax Moth (*Galleria mellonella*, L.) is common and causes much damage.

Family VESPIDAE.

Subfamily *VESPINAE*.

Genus Polistes, Latr.

P. pacificus, F. Essequebo Coast. An uncommon species.

P. analis, F. A fairly common species in the interior.

P. versicolor, Oliv. A common species on the coast lands.

P. goeldii, Ducke. A rare species in the interior.

P. canadensis, L., var. *amazonicus*, Schulz. The commonest species of *Polistes* in the Colony, occurring everywhere. Unless severely molested it rarely attacks people, but its sting is both powerful and painful, and causes a severe swelling. Large nests are rarely seen, the usual number of cells being about twenty. Beneath bridges, houses, on the rafters, under the eaves, beneath the platform of railway stations, behind pictures, etc., are favourite nesting-places for this species. It appears to prefer domestic habitations for its nesting-places. The short wooden bridges which span the navigation trenches on sugar estates are always thickly infested beneath with the nests of these insects, and passing beneath such bridges in a small boat is always an exciting and quite occasionally a painful experience. In dwelling-houses they are always a source of danger, especially when children are about. The local name is "marabunta." Destroying marabunta nests with a wad of dried palm leaves attached to a long pole soaked in kerosene and ignited is an interesting operation for an onlooker at a respectful distance. At times these wasps will remain quite motionless in an alert position on their nests for hours together, as though on guard. From the economic standpoint they are exceedingly useful, for they may often be seen hunting for and consuming the larvae of various agricultural pests, especially the Rice Worm (*Laphygma frugiperda*, S. & A.). The nests are irregular in structure and not strongly made, for pieces are frequently falling from the nest. The flight of this insect is somewhat clumsy.

P. crinitus, Felton. An uncommon species on the coast lands.

Genus POLYBIA, Lep.

P. fulvofasciata, de G. (= *phthisica*, F.). A common species on the coast lands; the nests are frequently found attached to the under surfaces of leaves, especially those of the mango tree. Large nests are seldom encountered.

P. occidentalis, Oliv. An exceedingly common species throughout the coast lands, and at times encountered in the interior. The nests are found attached to the under surfaces of many species of palms. The nests are never large, more or less circular in shape, and constructed of exceedingly light and fragile material. This small wasp is not unduly pugnacious, and seldom attacks unless the nest is damaged; it is thus frequently encountered when felling the branches of young coconut palms. The sting has no great lasting effects, but the first shock is exceedingly painful. On one occasion a gardener who was trimming a hedge of Barbados Cherry (*Malphigia glabra*) brought into the laboratory a good-sized nest of this species which he had very carefully removed with some of the wasps *in situ* on the outside of the nest. The local name is "honey marabunta." A native method of destroying such nests is to seize the nest quickly and firmly with both hands and then crush it. An individual possessed of large and thick-skinned hands is likely to be the most successful.

P. fastidiosuscula, Sauss., var. *sampaioi*, Ducke. Appears to take the place of the foregoing in the interior, where it is common. It has never been taken on the coast lands. The nest is often met with attached to the under surfaces of palm leaves.

P. fasciata, Lep. A species by no means of infrequent occurrence both on the coast lands and interior. A small nest was taken on one occasion attached to the floor-boards beneath a house; the structure is somewhat peculiar (see photo). Length about $2\frac{1}{2}$ inches; length of single cell $\frac{3}{4}$ inch.

P. fuscicornis, Lep. A rare species from the interior.

P. chrysothorax, Web. A fairly common species only encountered on the coast lands. Large pendant nests nearly a foot in length and roughly cylindrical are constructed; the one actually observed was attached to a bush only a short distance from the ground. This nest was unfortunately destroyed in an attempt to secure it.

P. dimidiata, Oliv. Rockstone, Essequebo River.

P. constructrix, Sauss. Tumatumari, Essequebo River.

P. jurinei, Sauss. Issororo, N.W.D.

P. sericea, Oliv. Tumatumari, Essequebo River.

P. sycophanta, Gribodo. An uncommon species with a wide distribution.

P. velutina, Ducke. Issororo, N.W.D.

P. rejecta, F. A species with a wide distribution, but uncommon.

P. obidensis, Ducke. Puruni River.

Genus Protopolybia, Ducke.

P. laboriosa, Sauss. Rockstone, Essequebo River.

Genus Metapolybia, Ducke.

M. pediculata, Sauss. A fairly common species which builds its nests on beams beneath houses. The nest, which is constructed of papery material, is usually about 5 inches in diameter and about 1 inch in thickness and of a flattened irregular appearance. It is by no means a conspicuous object, and is often of much the same colour as the beam to which it is attached. This insect shows no hostile tendencies, and the taking of the entire nest is quite a safe undertaking. It has only been observed in the interior.

Genus Chartergus, Lepeletier.

C. chartarius, Oliv. A fairly common species in the interior. The nest of this species is a well-known object and has been previously described by a number of authors. They are prized by many colonists as "curios," and fetch a very fair price in Georgetown. These nests may sometimes be seen attached to the branches of trees overhanging the river. The taking of the nests is by no means an easy matter, as the insects resent any interference with their home. Nests, however, which overhang the river may be taken by getting a native to ascend quietly the particular tree to which the nest is attached and with one well-directed blow of a sharp cutlass sever the branch bearing the nest so that it falls into the river, whence it is eventually retrieved as soon as the wasps have left. An unsuccessful blow, however, spells disaster, and there is a case on record where such an incident occurred, and the unfortunate native rather than suffer jumped into the river many feet below and thus evaded the infuriated wasps.

Genus Charterginus, Fox.

C. pallidilineatus, Cameron. Issororo, N.W.D.

Genus Nectarina, Shuckard.

N. bilineolata, Spin., var. *möbiana*, Sauss. A species so far only taken in the Botanic Gardens, Georgetown. The nest was found attached to the end of a dried "arrow" of sugar-cane. Greatest diameter about $1\frac{1}{2}$ inches—depth $\frac{3}{4}$ inch.

N. scutellaris, F. Issororo, N.W.D.

N. lecheguana, Latr. Issororo, N.W.D.

Genus Synoeca, Saussure.

S. surinama, L. A common species on the coast lands and occurs at times in the interior. The nests of this species, which are irregular in shape, may usually be seen attached to trees in the Botanic Gardens, Georgetown.

The whole of one side of the nest is attached to the tree, and the external wall exhibits a slight "ribbing." The nests are often a foot or more in length. The sting of this species is particularly formidable, and it does not hesitate to use it when occasion arises. The adult wasps may often be seen feeding on decaying fruit which has fallen on the ground, and they frequently visit certain species of flowers. I have taken specimens of this insect with the "pollinia" of a species of Euphorbiaceous plant attached to its legs; this is by no means a common occurrence.

S. irina, Spin. An uncommon species in the interior.

Genus Apoica, Lepeletier.

A. pallida, Oliv. A common species on the coast lands. The nest, which is invariably attached to a tree and never far from the ground, is disc-shaped. The under surface consists of innumerable cells, the ends of which are exposed. The under surface is invariably crowded with adult wasps, which attach themselves each to a particular cell and remain motionless, an aspect is thus presented of a cluster of wasps adhering to the under surface of the nest; in this position the bright yellow tips of their abdomens are very conspicuous. They do not readily move from this position, and if slightly disturbed will only make a slight movement. Once while observing a large nest of this species I happened to approach rather too near, when one wasp left the nest and stung me on the forehead immediately between the eyes, and returned at once to its original position. The effect of the sting was as though a blow had been delivered, and in a short space of time a swelling the size of a fowl's egg made its appearance, accompanied by considerable pain. The species is readily attracted to artificial light.

A. pallens, F. Issororo, N.W.D.

Genus Mischocyttarus, Saussure.

M. labiatus, F. A fairly common species on the coast lands. Only small nests are constructed.

Subfamily *EUMENIDINAE.*

Genus Montezumia, Sauss.

M. leprieuri, Spin. (1841) (= *M. rodwayi*, Cam. (1911). An uncommon species taken in the vicinity of Georgetown.

M. nigriceps, Spin. One of the commonest species of *Hymenoptera* on the coast lands. Also a species of particular economic value, as it hunts for and destroys the larvae of many agricultural pests, including the Rice Worm (*Laphygma frugiperda*, S. & A.) and the Para-grass Worm (*Mocis repanda*, F.). This wasp may frequently be seen searching for its prey amongst grass and tall rice. A large pendant, irregularly-shaped nest is formed, which is somewhat fragile in its structure. These nests contain a large and active community.

M. infernalis, Spin. An uncommon species on the coast lands. According to C. B. Williams, who has observed the habits of this wasp, it constructs burrows in the clay banks of the canals or trenches to be found on all sugar estates. Green caterpillars are stored up in the nest, and an egg is deposited, which is hung from the roof of the burrow by a long stalk. The opening of the burrow is small in comparison with the size of the wasp.

M. infundibuliformis, F. Issororo, N.W.D.

Genus Eumenes, Latreille.

E. canaliculata, Oliv. An exceedingly common species to be met with mostly on the coast lands. Its dome-shaped mud cells, in small colonies of five or six and sometimes more, are objects of common observation attached to the rafters beneath houses and in sheltered spots on walls and palings. These mud cells (see photo) are usually about $\frac{1}{2}$ inch in height and with a diameter of about $\frac{1}{2}$ inch. Some cells possess a kind of " neck " at the top of the cell, giving it the appearance of a squat-shaped earthen bottle. These cells are stored with Lepidopterous larvae usually slightly over an inch in length and, of course, paralysed by the sting of the wasp at the time of capture. From four to six such larvae are stored. The wasp larva becomes mature in ten days to two weeks from the time of emergence from the egg. The pupal stage lasts slightly over a week. The adult wasp emerges from the cell by biting a circular hole in one side. These empty cells are afterwards utilised by a species of *Trypoxylon* for its nest, and stored with spiders. A small species of black ant (*Cremastogaster*, sp.) finally colonises these disused cells. In constructing such cells the adult wasp holds the piece of moist and plastic mud in position on the half-constructed nest by means of the two front pairs of legs, and the delicate process of moulding the mud around the edge of the nest is performed with the mandibles, which are long and well suited to the work. During the operation the long antennae are bent downwards and kept rapidly moving about the work as though guiding it and preserving the symmetry of the structure. A small species of Chrysid was bred on one occasion from the mud cells of this *Eumenes*.

E. callimorpha, Sauss. Vicinity of Georgetown.

Genus Pachymenes, Sauss.

P. pallipes, Oliv. Onderneeming, Essequebo.

Genus Zethus, Fab.

Z. mexicanus, L., var. *lugubris*, Perty. An uncommon species on the coast lands.

Z. gigas, Spin. Issororo, N.W.D.

Z. sichelianus, Sauss. Inhabiting disused borings in timber, Courantyne Coast, Berbice.

Genus Odynerus, Latr.

O. nasidens, Latr. Courantyne Coast, Berbice.

O. clavilineatus, Cameron. An uncommon species in the interior.

FOSSORES.

Family MUTILLIDAE

Genus Mutilla, L.

M. (*Thaumatomutilla*) *parallela*, Klug. A fairly common species on the sandy soils of the interior.

M. mediata, F. From Courantyne Coast, Berbice. Taken while issuing from some disused borings in timber.

Genus Thaumatomutilla, André.

T. ocellaris, Klug. Tumatumari, Essequebo River.

Family SCOLIADAE.

Subfamily *TIPHIINAE.*

Genus Tiphia, Fab.

T. parallela, Smith. The larva of this wasp is parasitic on the larva of *Dyscinetus bidentatus*, Burm. (Coleoptera); fairly common on the coast lands.

Genus Dielis, Sauss.

D. dorsata, F. Of common occurrence in most parts of the Colony.

D. hyalina, Lep. (= *D. fallax*, Sauss.). Fairly common in most parts.

D. variegata, F. Issororo, N.W.D.

Genus Elis, F.

E. flavopicta, Smith. Turkeyn, East Coast, Demerara.

Family RHOPALOSOMIDAE.

Genus Rhopalosoma, Schulz.

R. guianense, Schulz. At light, Rockstone, Essequebo River.

Family PSAMMOCHARIDAE.

Genus Pseudagenia, Kohl.

P. comparata, Sm. Tumatumari, Essequebo River.
P. chlorosoma, Sm. Puruni River.

Subfamily *PEPSINAE.*

Genus Cryptochilus, Panz.

C. purpureipes. A common species on the coast lands.

Genus Pepsis, Fab.

P. tinctipennis, Smith. Issororo, N.W.D.
P. sapphiria, P. de B. Rockstone, Essequebo River.
P. jucunda, Mocs. Rockstone, Essequebo River.
P. chlorotica, Mocs. Onderneeming, Essequebo.
P. nigrescens, Smith. Rockstone, Essequebo River.
P. dimidiata, F. Rockstone, Essequebo River.
P. amethystina, F. A common species in most parts of the Colony.
P. seladonica, Dahlb. Issororo, N.W.D.

Subfamily *PSAMMOCHARINAE.*

Genus Pompilogaster, Ashm.

P. philadelphica, Lep. A common species on the coast lands.

Subfamily *SPHECINAE.*

Genus Sceliphron, Klug.

S. fistulare, Dahlb. This species is widely distributed. Its mud nests are common objects on palings, beneath houses, and at times within the house itself, behind pictures, etc. The nests are somewhat irregular in shape and may contain as many as eight or ten cells. Sometimes only two cells are constructed together, when the architecture is then better demonstrated. The usual procedure is to build one cell and attach it firmly, and then to build other cells around it. Each cell is stored with spiders, from sixteen to twenty according to the size of the spiders. As soon as the requisite number of spiders has been obtained the cell is closed up. The egg, according to C. B. Williams, is deposited on dorsal surface of the abdomen of the first spider placed in the cell. The following observations by Mr. Williams on the habits of this wasp are of interest. A wasp which was engaged in constructing its mud cells was observed, and its movements recorded as follows—

12.5′ 30″ p.m. gone for mud,
12.9′ 10″ p.m. returned,
12.10′ 15″ p.m. gone,
12.17′ 58″ p.m. returned,
12.19′ 20″ p.m. gone again,
12.22′ 20″ p.m. returned,
12.23′ 10″ p.m. gone.

At 12.37′ 45″ the wasp entered its nest and remained inside; 12.38′ 50″ the wasp flew away, and on inspection the nest was found to contain a spider (Fam. *Argiopidae*—*Gasteracanthinae*) with an egg on dorsal surface of abdomen. This spider was eventually removed by myself. At 12.51′ 15″ the wasp returned with another spider, and went away 12.52′ 15″. At 4.10 p.m. the nest was almost completely closed. The egg of this species is sausage-shaped and slightly curved, dull yellowish white in colour, with small almost transparent areas towards each end; length 3·4 mm. Young larvae when first hatched out are almost 4 mm. in length. They soon attach themselves to a spider, which they proceed to consume, leaving only the legs. Development is completed in about two weeks. The larva then commences to spin its cocoon, which occupies several days. The cocoon is dark brown in colour, and of a papery consistency, easily broken. Pupation lasts a little over a week, and the adult wasp then bites its way out through the mud wall of the nest, leaving a neat circular hole. The small green metallic bee, *Euglossa cordata*, L., often utilises these disused cells for its nest. A fungus occasionally destroys the stored spiders and finally the young larvae. No actual parasite of the species has been observed up to the present. It appears, however, that only about 60 % of the stored cells produce an adult wasp.

S. figulus, Dahlb. Closely allied to the above species, and with similar habits and distribution, though not so numerous.

Genus Sphex, L.

S. ichneumoneus, L. A common and widely distributed species throughout the Colony. For its subterranean nests it usually chooses a dry piece of soil, often in the centre of a path or other places where people are frequently passing. While constructing the initial excavation for its nest it is a most conspicuous object, moving rapidly about on the surface of the soil. The following observations made by Mr. C. B. Williams are of interest. "In this instance the insect was boring into soft pegass soil on swampy land at the foot of a hill. High spring tides from the river invariably cover the land. The burrow was commenced about 1.40 p.m., and at 1.45 p.m. it was about $\frac{1}{2}$ inch deep. At 2.19 the wasp entered the hole backwards, remaining below a few minutes, and then came out again. Burrowing continued till 4 p.m. These nests are stored with four or five short-winged grasshoppers, either nymphs or brachypterous species; the nest is not closed up between the insertion of each grasshopper."

Sphex (*Isodontia*) *costipennis*, Spin. Issororo, N.W.D.

S. (*Harpactopus*) *thomae*, F. An uncommon species which does not occur on the coast lands. Constructs burrows in soil and stores them with a single grasshopper, which is placed head first in the nest. The egg is attached at the base of the grasshopper's hind-leg (C. B. Williams).

Genus Podium, F.

P. denticulatum, Sm. An uncommon though widely distributed species.

Subfamily *PHILANTHINAE.*

Genus Cerceris, Latr.

C. (*Trachypus*) *mexicanus*, Cameron. An uncommon species. Taken while emerging from its burrow in sandy soil at the base of a tree. Plantation Bath, Berbice.

Subfamily *BEMBICINAE.*

Genus Bembidula, Burm.

B. discisa, Tasch. Upper Demerara River.
B. variegata, Ol. Upper Demerara River.

Genus Monedula, Latr.

M. pantherina, Handl. A fairly common species in some parts of the interior, especially where sandy soils exist. It is quite the largest and fiercest of these insects to be found in the Colony. Its burrows are stored with *Tabanidae.*

M. punctata, Lep. An uncommon species in the interior.

M. signata, Latr. The commonest and most widely distributed Bembex in British Guiana. It may frequently be seen about mules and cattle in the pastures waiting to carry off the Tabanidae which are always present about these animals. Their burrows may be seen in sandy soil, and usually occur in colonies of twenty or thirty. A large species of Bombyliid fly may be seen about these burrows, occasionally entering them. Its exact relationship to the wasp has never been actually traced, but it is quite possibly parasitic. The fly belongs to the genus *Anthrax.*

Subfamily *GORYTINAE.*

Genus Gorytes, Latr.

G. brasiliensis, Shuck. Rockstone, Essequebo River.

Subfamily *LARRINAE.*

Genus Tachytes, Panzer.

T. ametina, Cameron. Rockstone, Essequebo River.

Genus Larra, Fab.

L. rubricata, Smith. Rockstone, Essequebo River.

Subfamily *TRYPOXYLINAE.*

Genus Trypoxylon, Latr.

T. palliditarse, Sauss. A fairly common species on the coast lands.

T. fugax, F. This insect has been bred from the disused cells of *Eumenes canaliculata*, Ol. It is of fairly common occurrence.

T. brevicarinatum, Cameron. A common and widely distributed species all over the Colony. It usually constructs its nest of mud cells beneath a palm leaf. Sometimes as many as twenty-five cylindrical cells are found cemented together. The largest cells are nearly an inch in length and about $\frac{1}{4}$ of an inch in diameter. Small spiders are stored up by this species.

T. albitarse, F. Bred from a large-sized rounded mud nest. Potaro River.

T. nitidum, Sm. Issororo, N.W.D.

T. cinereum, Cameron. The habits of this species have been observed by Mr. C. B. Williams. "An elongate mud cell was constructed by one of these wasps in the angle of the woodwork of a door. When making these nests a 'ball' of mud is collected and applied to the side of the nest, gradually drawing it downwards as it adheres. A shrill buzzing sound is emitted the whole time. Thirty seconds to one minute are occupied in applying one 'ball' of mud. Spiders are stored."

Family TRIGONALIDAE

Genus Trigonalys, Westw.

T. melanoleuca, Westwood. A number of these insects emerged from the pupae of the Noctuid moth *Amyna octo*, Guen., which had been taken from just beneath the surface of the soil on a sugar estate.

Family CHRYSIDIDAE

Subfamily *CHRYSIDINAE.*

Genus Chrysis, L.

C. punctatissima, Spin. A common species on the coast lands.

C. distinctissima, Dahlb. Bartica, Essequebo River.

C. parvula, F. East Coast, Demerara.

Family BRACONIDAE.

Subfamily *CHELONINAE.*

Genus Fornicia, Brullé.

F. clathrata, Brullé. A larval parasite of the Limacodid moth, *Sibine fusca*, Stoll. This is a very abundant moth on the coast lands and attacks a large variety of economic plants. The parasite emerges before the larva is half developed. The percentage of parasitism is never very high.

Subfamily *BRACONINAE.*

Genus Lasiophorus, Hal.

L. fortispinus, Cameron. A fairly common species on the coast lands.

Genus Iphiaulax, Forster.

I. medianus, Cameron. This is the well-known parasite of the several species of *Diatraea* (Lepidoptera) which bore into sugar-cane in British Guiana. The species is a common one, it being an easy matter to capture either sex in the cane-fields. The life-history of the species has been observed in the field by Mr. Harold Moore, and the following is his own description: *—" On the morning of the 12th, in a field at Non Pareil, I noticed a female alight near the top of a cane-stump, run down the shoot, tapping it the while with her antennae, till she got to a *Diatraea* hole near the base. Into the tunnel she began pushing her ovipositor, when a slight movement on my part, in an endeavour to obtain a closer view of the proceedings, disturbed her. Off she flew, but merely to wheel round and alight again on the shoot, when she found the hole the same way, and began inserting her ovipositor. I lay prostrate on the trash bank, as motionless as possible, and watched. It was 9.28 a.m. Soon after her ovipositor had been inserted she gave a slight quick backward jerk with her abdomen, showing she had evidently felt something. Back down went her abdomen and again a similar jerk. This occurred three or four times, after which she kept quite still for several minutes, her ovipositor being well in the caterpillar's tunnel. She withdrew her ovipositor at 9.38, thus occupying about ten minutes in parasitising the caterpillar, of the presence of which I had no doubt.

* Published in the "Daily Argosy," Demerara, March 1913.

I cut out the cane-shoot and took it home. I could not examine it till next morning (13th), when I found it contained a caterpillar, and in the same tunnel with it was the egg of the parasite. It is about 3 mm. by about 1 mm. at the widest part—whitish, translucent, firm or leathery—narrow, elongated, tapering to a long point posteriorly, where there is a small curved blackish hook. The hook at the end is evidently for the purpose of keeping the egg in place. From the above it seems that the caterpillar is paralysed by the parasite at the time of oviposition. From observations made on previous occasions, however, it would appear that paralysis does not, or at least does not always, occur immediately, but comes on gradually. The firm texture of the egg prevents it from being injured should the caterpillar happen to wriggle against it. At 3.30 p.m. on the same day (13th) I observed that the egg had hatched and that the young larva was peacefully feeding, attached to the side of the ninth segment of the caterpillar. It had probably hatched during the forenoon. The egg-period is therefore very short—about one day. On the morning of the sixteenth the caterpillar was dead, almost the whole posterior half having been devoured by the parasite larva. By the morning of the 17th the parasite larva had completely devoured the caterpillar, and was spinning a cocoon in order to pupate. The larval period, too, is very short—about four days. The shortness of both the egg and larval stages can be very readily understood, when it is remembered that the larva requires fresh food, and has only a single caterpillar on which to feed. It of necessity therefore has to get through it rapidly, before extreme decomposition is reached, and do all its growing in that short time. The larva pupated at the angle between the shoot and the glass jar. It left the tunnel, probably on account of the latter shrinking through drying of the shoot. From other observations I know that the larval period is sometimes certainly a week. On the morning of the 31st the perfect insect emerged. Pupal period therefore about fourteen days. Time from egg-laying to adult is therefore about nineteen days." The cocoon is transparent and constructed of closely woven silk, giving a membranous appearance. In shape cylindrical, blunted at both ends. Colour whitish. Length 2·1 cm., diameter ·4 cm.

I. obscuricarinatus, Cameron. Issororo, N.W.D.

Subfamily *RHOGADINAE.*

Genus Megarhogas, Szep.

M. fuscipalpis, Cam. Rockstone, Essequebo River.

Subfamily *AGATHINAE.*

Genus Spilomicrodus, Cam.

S. nigriceps, Cam. Bartica, Essequebo River.

Family CHALCIDIDAE.

Subfamily *TRICHOGRAMMATINAE.*

Genus Trichogramma, Westw.

T. minutum, Riley. This well-known parasite is of common occurrence in the Colony as an egg-parasite of the Cane Borers (*Diatraea*) and several other species of Lepidoptera. Its life-history and habits when parasitising the ova of *Diatraea* have been fully worked out by myself and published in the Journal of the Board of Agriculture, British Guiana, vol. vi, No. 4.

Subfamily *CHALCIDINAE.*

Genus Chalcis, F.

C. pandora, Cwfd. Bred from the pupa case of a species of Hesperid (sp. indet.) butterfly feeding on cane blades. An uncommon species.

C. annulata, F. A common parasite of *Brassolis sophorae*, L. (*Lepidoptera*) and also *Caligo ilioneus ilioneus*, Cramer (*Lepidoptera*). It is widely distributed and the commonest Chalcid in the Colony.

Genus Smicra, Spin.

S. fulvomaculata, Cam. Bred from the pupa of a Hesperid butterfly (sp. indet.). An uncommon species.

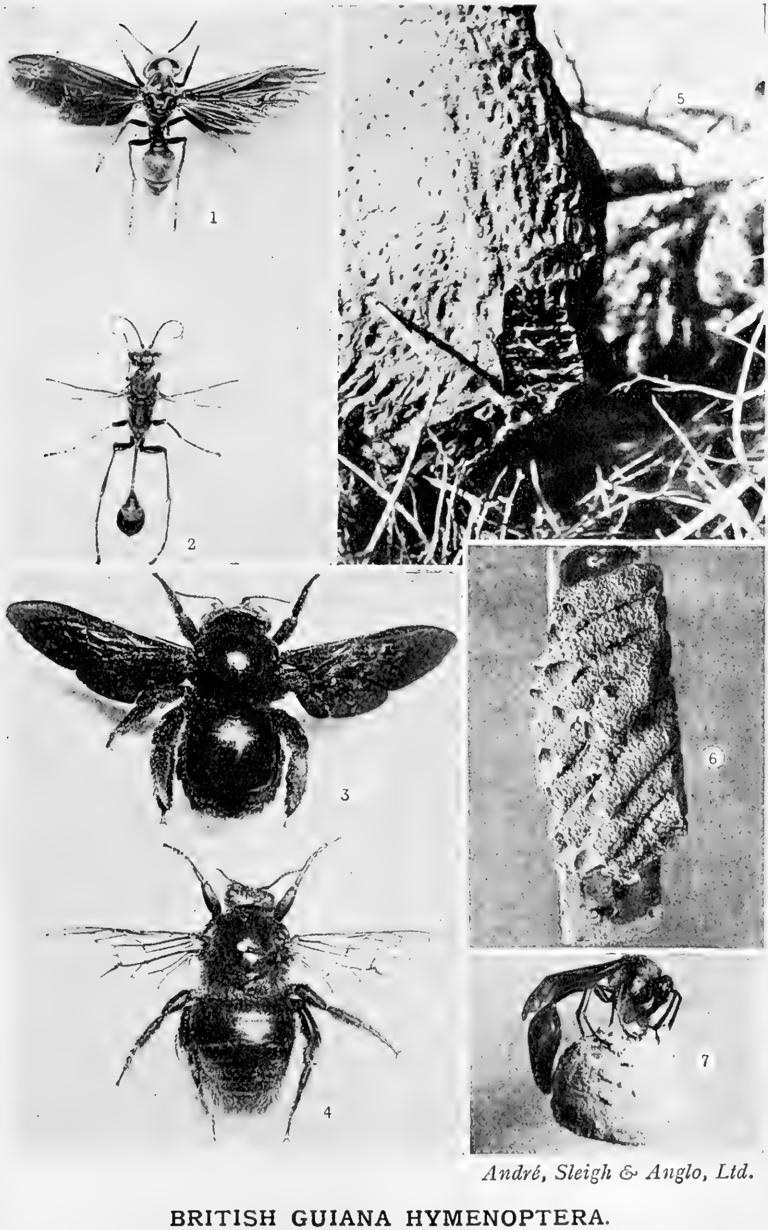
Family EVANIIDAE.

Subfamily *EVANIINAE.*

Genus Evania, F.

E. erythraspis, Cameron. Issororo, N.W.D.

E. appendigaster, L. This insect emerged from a large box containing a quantity of seed rice packed in bags. Innumerable Blattid egg-cases (*Periplaneta americana* L.), as well as adult insects, were in the box.



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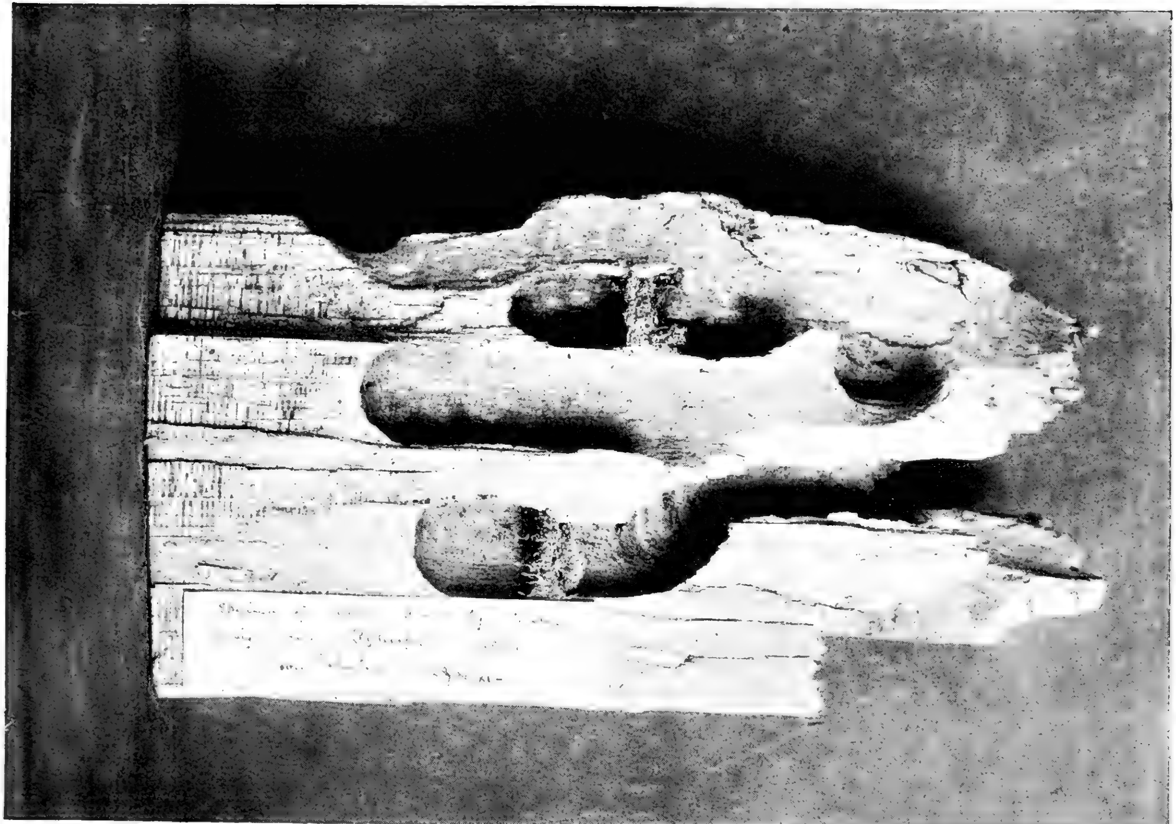
BRITISH GUIANA HYMENOPTERA.



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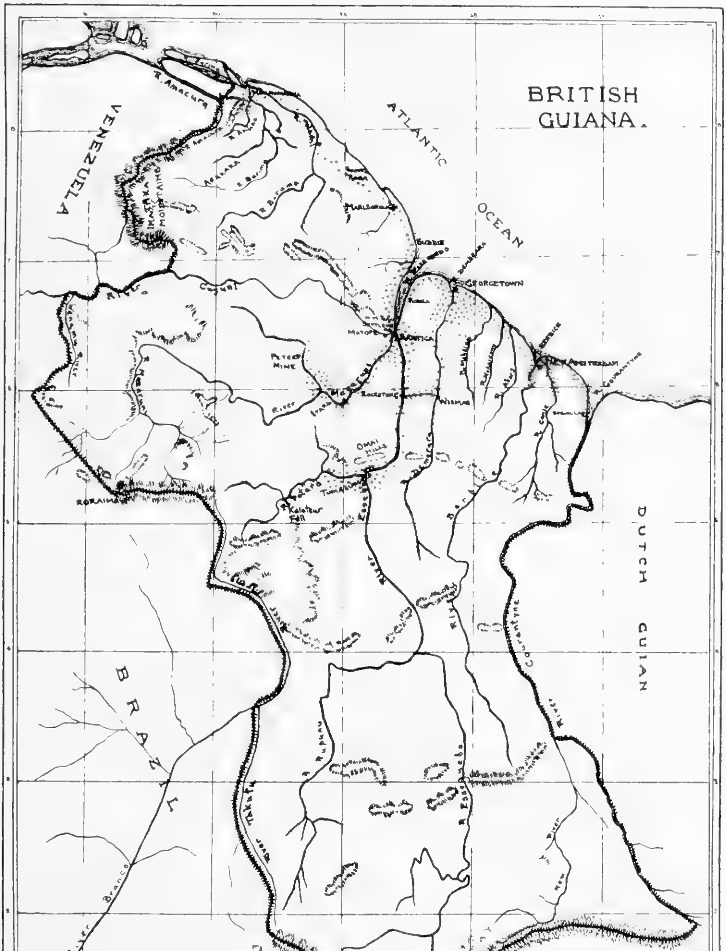
BORINGS OF XYLOCOPA FIMBRIATA IN WOOD.

André, Sleigh & Anglo, Ltd.

MUD NEST OF SCELIPHRON FISTULARE, Dahlb.



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SKETCH MAP SHOWING LOCALITIES OF HYMENOPTERA, BRITISH GUIANA.

Family ICHNEUMONIDAE, Leach.

Subfamily *OPHIONINAE.*

Genus Eiphosoma, Cresson.

E. aztecum, Cress.? Issororo, N.W.D.
E. texanum, Cam. Botanic Gardens, Georgetown.

Genus Henicospilus, Stephens.

H. major, Morley. Attracted to artificial light. Rockstone, Essequebo River.

H. nigricornis, Brullé. Attracted to artificial light. Rockstone, Essequebo River.

H. flavoscutellatus, Brullé. Attracted to artificial light. Rockstone, Essequebo River.

H. maculiceps, Cam. Bred from the pupa-case of a Noctuid moth, *Amyna octo*, Guen. An uncommon species on the coast lands.

Genus Itoplectis.

I. platana, Morley.

Subfamily *ICHEUMONINAE.*

Genus Joppa, F.

J. antennator, F. Rockstone, Essequebo River.
J. geminata, Vriich. Courantyne Coast, Berbice.

Explanation of Plates XXI–XXIII.

PLATE XXI.

Fig. 1. *Synoeca surinama*, L.
2. *Sceliphron fistulare*, Dahlb.
3. *Xylocopa fimbriata*, F. ♀.
4. ,, ,, F. ♂.
5. Mud nest of *Melipona guianae*, Ckll.
6. Mud nest of *Trypoxylon brevicarinatum*, Cam.
7. *Eumenes canaliculata*, Oliv., on its mud cell.

Figs. 1, 2, 3, 4, 5 and 7 are about the natural size. Fig. 6 is considerably reduced.

PLATE XXII.

Borings of *Xylocopa fimbriata*, F., in soft wood. Note the "wad" of sawdust which divides the cells. Considerably reduced.

PLATE XXIII.

Mud nest of *Sceliphron fistulare*, Dahlb. Slightly smaller than natural size.

XI. *On a Collection of Butterflies taken in East Africa by Mr. W. A. Lamborn.* By H. Eltringham, M.A., D.Sc. *With notes on the* Pierinae, by Dr. F. A. Dixey, F.R.S., *and description of a new form of* P. dardanus ♀, by Prof. E. B. Poulton, F.R.S.

[Read June 6th, 1917.]

The Hope Department at Oxford has recently received a Collection of *Lepidoptera,* chiefly *Rhopalocera,* taken in 1916 by Mr. W. A. Lamborn in the northern central part of what was German East Africa, and it may be not without interest to give particulars of one of the first consignments forwarded from one of our newly acquired territories.

The dates and localities with notes as to the type of country are as follows. The elevations are approximate.

May 3–6	New Moshi	37° 24′ E. 3° 24′ S.	Thin woodland, 2925 ft.
,, 10–11	Sanja River	37° 10′ E. 3° 28′ S.	Plain, 2900 ft.
,, 10–16	Arusha	36° 42′ E. 3° 20′ S.	Dense evergreen forest, 4550 ft.
,, 19–20	Kikuletwa-Darjama R., Noisinak Bridge.	37° E. 3° 30′ S.	Thorn-bush, 3500 ft.
,, 20	Loldiloi	36° 50′ E. 3° 36′ S.	Wooded borders of river, dry plains beyond, 3000 ft.
,, 22	Muruangoin, Ssenje Drift	36° 42′ E. 3° 38′ S.	Thorn-bush, 3550 ft.
,, 26	Lolkissale	36° 26′ E. 3° 50′ S.	Thorn-bush, 4–5000 ft.
June 1–6, 19	Ufiomi (plain)	35° 50′ E. 4° 16′ S.	Dried plain, 4440 ft.
,, 2–6	Ufiomi (woodland)	35° 50° E. 4° 16′ S.	Green river gorge, woodland, with large trees.
,, 9	Ssalanga	35° 50′ E. 4° 30′ S.	Thorn-bush and woodland, 4500 ft.
,, 20	Taranjere River, $2\frac{1}{2}$ m. S. of,	About 36° E. 4° S.	Thorn-bush and woodland, 3800 ft.
July 1	New Moshi	37° 24′ E. 3° 24′ S.	Thin woodland, 2925 ft.
,, 10	Tanga-Moshi Railway, Same.	37° 46′ E. 4° 8′ S.	Thorn-bush, 2900 ft.

July 14	Tanga-Moshi Railway, Mabirioni, ("German Bridge")	37° 56′ E. 4° 36′ S.	Thorn-bush.
„ 23	Handeni	About 38° E. 6° S.	Woodland and thorn-bush, 2800 ft.
Sept. 6	Bagamoyo, 37 m. N. of Dar-es-Salam, on coast		Coco plantation, 100 ft.
„ 13	Ngerengere, on Central Railway, 100 m. W. of Dar-es-Salam.		Thick thorn-bush.
„ 30	Kondutschi, 10 m. N. of Dar-es-Salam, on coast		Coco plantation, 50 ft.
Nov. 10–14	Tanga	5° S. on coast.	Coco plantation, 50 ft.

At the above dates and localities the wet season prevailed until about June 16, when the dry began. The rain of the next change was first encountered on September 6.

DANAINAE.

Danaida formosa, Godm.

A nice series in fine condition.

Same, Mabirioni. 9 ♂♂, 3 ♀♀. May 16–July 14.

D. petiverana, Doubl.

Ufiomi (woodland). 1 ♂. June 4.

D. chrysippus, Linn.

Forty examples, of which only three are typical *chrysippus*. One approaches *alcippoides*, Moore, and three are of the *albinus*, Lanz, form. The rest are all *dorippus*, Klug.* The remarkable corresponding predominance of the *daira* form of *Acraea encedon* in this collection is referred to under that species.

All *dorippus* unless otherwise stated.

Kikuletwa, Darjama River (thorn-bush)—1 ♀ Mar. 19; Loldiloi (wooded river-side)—11 ♂♂, 1 ♂ *chrysippus*, 1 ♂

* In Seitz' "Macrolepidoptera," Professor Aurivillius separates the *dorippus* form as a distinct species, with the remark that there is not sufficient evidence of its specific identity with *chrysippus*! *Any good series, however, shows many remarkable intermediates, and specimens in the Hope Department bred by the late Col. Manders show in a large number of specimens the instability of the fore-wing apical black. There can be no doubt that* dorippus *is a form of* chrysippus *just as* inaria *is a form of* misippus.

albinus May 20; Lolkissale (thorn-bush)—1 ♀ May 26; Same (thorn-bush) 4 ♂♂, 3 ♀♀, 1 ♀ *chrysippus* July 10; 1 ♂, 1 ♀, 1 ♂ *chrysippus*, 1 ♂ *albinus* July 11; Mabirioni (thorn-bush) 6 ♂♂, 5 ♀♀, 1 ♂ *chrysippus* (approaching *alcippoides*), 1 ♀ *albinus* July 14.

Amauris ochlea, Boisd.

Thirty examples, all typical.

Bagamoyo. 11 ♂♂, 19 ♀♀. Sept. 6.

A. damocles f. damoclides, Stgr.

Loldiloi. 1 ♂. May 20.

A. niavius dominicanus, Trim.

Mabirioni, Bagamoyo. 3 ♂♂. July 14–Sept. 6.

A. albimaculata, Butl.

New Moshi, Sanja R., Ufiomi (plains). 23 ♂♂, 5 ♀♀. May 3–June 6.

[Note.—*A. echeria* is rare in Kikuyu, common on Kilimanjaro (Rogers, Trans. Ent. Soc., p. 511, 1908), and *albimaculata* relatively very rare at Entebbe.]

SATYRINAE

Gnophodes parmeno diversa, Butl.

A single example of the southern and eastern race of *G. parmeno*.

Ufiomi (woodland). 1 ♀. June 3.

Neocoenyra duplex, Butl.

A single example, apparently of this species, though differing from typical examples in having the fore-wing eye spot area merely dusted with red brown scales, instead of being distinctly red brown.

Ufiomi (woodland). 1 ♂. June 4.

Physcaeneura leda, Gerst.

Six specimens somewhat variable in size, but otherwise normal.

Tanga. 5 ♂, 1 ♀. Nov. 10–14.

ACRAEINAE.

Acraea quirina, Fab.

Five females of the usual brownish form. The note accompanying these examples describes the locality as dense evergreen forest. This may account for the absence of male specimens, which probably frequent more open situations.

Arusha. 5 ♀♀. May 16.

A. neobule, Doubl.

Five examples of this widely distributed species, all of typical pattern and colour.

Ufiomi (plains), Muruangoin, Same. 5 ♂♂. May 22–July 10.

A. zetes, Linn.

One male of the *acara* form so greatly modified in resemblance to *A. pseudolycia astrigera*, Butl., that the male armature gives the principal evidence of its distinction from that species. *Zetes* and *pseudolycia* are certainly closely allied, and the resemblance would appear to be due to affinity rather than to mimetic association.

Kikuletwa-Darjama River. 1 ♂. May 19.

A. insignis, Dist.

A single female approaching the *siginna* form.

Handeni. 1 ♀. July 23.

A. chilo, Godm.

Of the twelve examples received, ten are of the *crystallina* form of female, the remaining two are males of the ordinary form. It is remarkable that whereas the female *chilo* becomes more transparent as it extends southward, the female *braesia*, and to some extent its male also, becomes more transparent towards the northern limit of its range. The male *chilo*, on the other hand, shows some tendency to heavier spotting as it extends southward. The localities where the present examples were taken are further south than any yet recorded.

Same, Mabirioni. 2 ♂♂, 10 ♀♀. July 10–14.

A. egina, Cram.

Ten specimens, three of which are distinctly of the form *harrisoni*, Sharpe, whilst two other males have slight red streaks in the fore-wing apical area. The *harrisoni* form has previously been reported from Bukoba, L. Kivu district, by Grünberg, who renamed it *kivuensis*, and occasional examples have been noted from Uganda to Nyassa Land. It is merely an intermediate between the type and the form *areca*, Mab.

Ufiomi. 7 ♂♂, 3 ♀♀. June 2–19. (One *harrisoni* ♂, June 2, woodland, the rest plains.)

A. acrita manca, Thur.

A fine series of this interesting form. The characteristic fore-wing subapical spots show considerable variation in number and size, and in one or two examples they are present only on the underside. The fore-wing apical black is slightly broader and the black rings on hind-wing margin are more pronounced than in typical *manca*. The examples are thus to some extent intermediate between *manca* and *manca* f. *lidica*. Nearly all the females have a brownish ground-colour, though in one or two examples there is in the hind-wing a tendency towards the typical flame orange of the male. The wet season continued till about June 16, so that these females are fairly consistently of the wet form.

Ufiomi (plains). 19 ♂♂, 21 ♀♀. June 1–6, 19 (woodland). 1 ♂, 1 ♀. June 5; Ssalanga. 2 ♀. June 9.

A. caldarena f. neluska, Oberth.

Two examples of this form occur. They present no unusual features. The form is rather rare in collections.

Handeni. 1 ♂, 1 ♀. June 23.

A. pudorella pudorella, Auriv.

One dwarf male example.

Ufiomi (plains). 1 ♂. June 1.

A. braesia braesia, Godm.

In a long series of this species there is one male example of the *regalis* form, and several somewhat intermediate thereto. No specimen shows the peculiarities of the

Somaliland form mentioned in my monograph, though several of the females are more than usually transparent.

Ufiomi (plains), Same, Tanga Moshi Ry., Ssalanga, Mabirioni, Handeni. 34 ♂♂, 8 ♀♀. June 5–July 23.

A. equatorialis, Neave.

A single male example in fine condition, presenting the coloration of true *equatorialis* combined with the larger size so usually found in *equatorialis anaemia*, Eltr. Also one other specimen of the *anaemia* form, unfortunately without data.

Kikuletwa-Darjama R. 1 ♂. May 19.

A. natalica natalica, Boisd.

Five examples of this common species all of typical appearance.

New Moshi, Sanja R. 4 ♂♂, 1 ♀. May 6–11.

A. anacreon, Trim.

Two examples of this species were taken, one male and one female. Though somewhat faded and worn they are interesting as showing an intermediate condition between *anacreon bomba* f. *induna*, Trim., and *anacreon anacreontica*, Gr. Sm. As in the latter, the fore-wing apical black is very much reduced and the outer half of the wing is ochreous; the base of fore-wing and the whole hind-wing is deep orange as in the *induna* form. They thus support my contention that *anacreon, bomba*, and *anacreontica* are all forms of the same species. The resemblance of the female example to the specimens of *acrita manca*, with which it was taken, is very striking.

Ssalanga. 1 ♂. June 9.

Ufiomi (plains). 1 ♀. June 19.

A. encedon, Linn.

Of twenty-one examples there is no specimen of true *encedon*. The *daira* form largely predominates, and *alcippina* is absent. It is interesting to note that of forty examples of *D. chrysippus* in the same collection, three are typical, one is the *alcippus* form, three *albinus*, and all the rest are of the *dorippus* form to which *encedon* f. *daira* corresponds.

Daira.—New Moshi (thin woodland) 5 ♂♂ May 6;

Sanja River (plains) 2 ♀♀ May 10; Arusha (dense forest) 1 ♀ May 10, 2 ♀♀ May 16; Muruangoin (thorn-bush) 1 ♂ May 22; Ufiomi (plains) 1 ♀ June 2; (woodland) 1 ♀ June 5; Mabirioni (thorn-bush) 2 ♂♂ July 14; Handeni (woodland and thorn) 1 ♀ July 23.

Encedon (near *infuscata*)—Arusha 1 ♀ May 16.

Encedon, worn, with rather dull coloration—Ufiomi (woodland) 1 ♀ June 4; Mabirioni 1 ♂ July 14.

Lycia—New Moshi 1 ♀ May 6; Handeni 1 ♂ July 23.

The above analysis of localities shows that there is little or no correspondence between the form and the character of the habitat.

A. sotikensis, Sharpe.

All the specimens are of the form *rowena*, Eltr., distinguished from the typical form by having the inner marginal part of hind-wing patch yellow instead of red. This form has hitherto only been reported from Mt. Ruwenzori.

Ufiomi. 8 ♂♂, 2 ♀♀. June 1–5 (1 ♂, 2 ♀♀ plains, the rest woodland).

A. cabira, Hoppf.

Three examples of the typical form not calling for special comment.

Arusha, Sanja R., Mabirioni. 3 ♀♀. May 10–July 14.

A. acerata, Hew.

Three examples in marking somewhat intermediate between the type and the *vinidia* form. One female is intermediate to the form *tenella*.

Ufiomi (woodland). 1 ♂. June 4.

New Moshi. 2 ♀♀. July 1.

A. terpsichore, Linn.

A long series of this abundant species. All the males are of the form *rougeti*, Guer. The females are not so variable in form as is usual in this species. Four resemble the males, the remainder are largely of the form having dusky fore-wings with more or less whitish subapical patch, one or two having a great deal of white on the fore-wing. Only two of the males have any red marks on the hind-wing underside.

Kikuletwa-Darjama R., Ufiomi, Same, Handeni, New

Moshi. 9 ♂♂, 34 ♀♀. (5 ♂♂, 27 ♀♀. Ufiomi plains, 1 ♀ woodland.) May 19–July 23.

A. pharsalus, Ward.

Two males of the form *pharsaloides*, Holl., which seems generally to replace the typical form in these localities.

New Moshi, Arusha. 2 ♂♂. May 6–16.

A. perenna, Doubl.

One female example of the form *thesprio*, Oberth., in which the red colour extends over the greater part of the fore-wing.

New Moshi. 1 ♀. May 6.

A. oreas, Sharpe.

Two examples of which the male is of the *albimaculata* form, the other, a female, has the tip of the left fore-wing sienna brown instead of black.

Arusha. 1 ♂, 1 ♀. May 13–16.

A. esebria, Hew.

A series showing the usual variability. The majority are of the form *jacksoni*, Sharpe. Two are of the form *protea*, Trim.; one female is form *monteironis*, Butl., and one female intermediate between *monteironis* and *nubilata*, Eltr.

Arusha, Ufiomi (woodland), Same, Mabirioni. 9 ♂♂, 6 ♀♀. May 14–July 14.

A. lycoa, Godt.

Two examples of the form *fallax*, Rogenh. This is the most southern locality I have for this form.

Arusha. 2 ♀♀. May 10–13.

A. johnstoni, Godm.

One male is typical. The other two are of the variety of *confusa*, Rogenh., which has the hind-wing discal patch white as well as the fore-wing spots. (See Trans. Ent. Soc., p. 342, 1912.)

New Moshi, Mabirioni. 3 ♂♂. July 1–14.

Planema aganice montana, Butl.

Kikuletwa-Darjama R., Ufiomi (woodland), Mabirioni, Arusha. 1 ♂, 8 ♀♀. May 16–July 14.

P. quadricolor, Rogenh.

Arusha. 1 ♀. May 13.

Pardopsis punctatissima, Boisd.

Same. 1 ♂, 1 ♀. July 10.

With reference to the position of this species Professor Aurivillius expresses the opinion (in Seitz' "Macrolepidoptera") that pending a knowledge of the early stages it should remain with the Acraeinae, with which it agrees in certain particulars, including the structure of the fore-legs. I was at some pains in my monograph of the Genus *Acraea* to point out that the species does not agree with *Acraea* in this last particular.

NYMPHALINAE

Euxanthe wakefieldi, Ward.

Handeni. 1 ♂, 1 ♀. July 23.

Charaxes etheocles, Cr.

New Moshi. 1 ♂. May 6.

C. candiope, Godt.

Ufiomi (woodland). 1 ♂. June 4.

C. cithaeron, Feld.

Kikuletwa-Darjama R. 1 ♂. May 19.

C. zoolina, Westw.

This dimorphic species is represented by two examples, one *zoolina* and the other *neanthes*, Hew.

Kikuletwa - Darjama R. ♀ (*zoolina*). May 20 (wet season).

New Moshi. ♂ (*neanthes*). July 1 (dry season).

C. baumanni, Rogenh.

Ufiomi (woodland). 1 ♂. June 2.

Euryphura achlys, Hoppf.

Ngerengere. 2 ♂♂. Sept. 13.

Euryphene senegalensis orientis, Karsch.

Kondutschi. 4 ♂♂, 2 ♀♀. Sept. 30.

Ephaedra neophron, Hoppf.

Two males of the ordinary form, and one male which appears to be a rather worn and faded specimen of the form *violacea*, Butl.

New Moshi. 1 ♂ (*violacea*). May 6.
Ngerengere. 2 ♂♂ (*neophron*). Sept. 13.

Hamanumida daedalus, Fab.

Handeni. 1 ♂. July 23.

Neptis agatha, Stoll.

Ufiomi (plains). 2 ♀♀. June 1.

N. saclava marpessa, Boisd.

The *marpessa* form is the continental representative of the Madagascar *saclava*, and is very widely distributed.

Ufiomi (woodland). 2 ♀♀. June 5.

Byblia ilithyia, Drur.

Same. 1 ♂, 1 ♀. July 10.

B. acheloia, Wallingr.

Wet f. *vulgaris*, Stgr.

Ufiomi (woodland). 1 ♂. June 2.

Eurytela hiarbas lita, R. & J.

The East African race of *hiarbas*, Drur.

Ufiomi (woodland). 1 ♂. June 2.

E. dryope angulata, Auriv.

The early stages of *hiarbas* and *dryope* are, according to Miss Fountaine, indistinguishable, though their specific identity seems not yet to have been established.

Ufiomi (woodland). 1 ♀. June 4.

Hypolimnas misippus, Linn.

One female of the typical form.

Same. 1 ♀. July 11.

Hypolimnas dubia, Pal.

Four examples of the *wahlbergi* form, showing considerable variation in size, the smallest 70 mm. in expanse and the largest 100 mm. Also four specimens of the *mima* form, of which one, a large female, has the hind-wing pale area white dusted with yellow.

Arusha, Mabirioni. 4 ♂♂ (*wahlbergi*). May 14–July 14.

Ssalanga, Ufiomi (woodland). 2 ♂♂, 2 ♀♀ (*mima*). June 4–9.

Pseudacraea lucretia expansa, Butl.

Handeni. 1 ♀. July 23.

Salamis parhassus aethiops, Pal.

Two fine examples. The species differs from *anacardii*, L., in having a glossy surface on the underside of both wings.

Ufiomi (woodland). 2 ♀♀. June 4.

Pyrameis cardui, Linn.

A female of this ubiquitous species taken at an elevation of 4500 ft.

Ssalanga. 1 ♀. June 9.

Catacroptera cloanthe obscurior, Stg.

One female of the dry form of *cloanthe*, though taken towards the end of the wet season.

Ufiomi (plains). 1 ♀. June 2.

Precis octavia, Cram.

A series of this species of which twelve are of the *sesamus* or dry season form, and one *natalensis*. The first example of *sesamus* was taken on June 2, and the wet season continued till about June 16. The remaining dates extend to June 19. One *sesamus* taken June 19 shows, by the red in the fore-wing cell, an approach towards an intermediate form and to the usual dry form of the west coast.

Ufiomi. 6 ♂♂, 6 ♀♀ (*sesamus*). June 2–6, 19 (3 ♂♂, 6 ♀♀ taken June 19, under eaves of native hut, Ufiomi plains; 3 ♂♂ in woodland, June 2–5).

Ufiomi (woodland). 1 ♀ (*natalensis*). June 4.

P. limnoria taveta, Rogenh.

New Moshi, Same. 1 ♂, 1 ♀. May 6–July 11.

P. antilope antilope, Feisth.

The dry season form.
Handeni. 1 ♂. July 23.

P. terea elgiva, Hew.

Ufiomi (woodland). 1 ♂. June 6.

LYCAENIDAE.

Teriomima freya, S. & K.

Handeni. 4 ♂♂ (one doubtful). July 23.

Spalgis lemolea, Druce.

Tanga. 1 ♂. Nov. 10–14.

Uranothauma falkensteini, Dew.

Ufiomi (woodland). 1 ♂. June 4.

Virachola antalus, Hoppf.

Ufiomi (plains). 1 ♀. June 2.

Polyommatus boeticus, Linn.

Ufiomi (plains). 1 ♂. June 2.

Azanus mirza, Plotz.

New Moshi. 2 ♂♂. May 3.

Azanus sigillatus, Butl.

New Moshi. 1 ♂. May 3.

PIERINAE.

Terias brigitta, Cram.

New Moshi. 1 ♂. May 3.

Terias regularis, Butl.

New Moshi, Tarangere R., Ufiomi (woodland). 9 ♂♂. May 3–June 20.

Teracolus eupompe, Klug.

Tarangere R. 1 ♂. June 20.

Teracolus evagore, Klug.

The form *antigone*, Boisd.
Same. 1 ♂. July 11.

Teracolus halimede, Klug.

Tarangere R. 9 ♂♂, 4 ♀♀. July 10–11.

Teracolus chrysonome, Klug.

Loldiloi, Ufiomi (plains), Tarangere R.. 3 ♂♂, 9 ♀♀. May 20–June 20.

Note.—From the last-named locality there were eight females and only one male.

Teracolus protomedia, Klug.

Same. 1 ♀. July 10.
"Damaged before capture."

Colias electo, Linn.

Ufiomi (plains). 4 ♂♂, one being white. June 2–3.

Eronia leda, Boisd.

Handeni. 1 ♂. July 23.

Eronia cleodora, Hübn.

Handeni, Mabirioni. 1 ♂, 1 ♀. July 14–23.

Leuceronia argia, Fabr.

Ufiomi (woodland), Handeni. 3 ♂♂. June 3–July 23.

Leuceronia thalassina, Boisd.

Ufiomi (woodland). 1 ♀. June 3.

Leuceronia buquetii, Boisd.

Handeni, Same. 1 ♂, 1 ♀. July 11–23.

Pinacopteryx vidua, Butl.

Ufiomi (woodland). 1 ♀. June 5.

Pinacopteryx pigea, Boisd.

New Moshi, Ufiomi. 4 ♂♂. May 6–June 4.

f. **astarte,** Butl.

Ufiomi (woodland). 1 ♂. June 4.

Belenois severina, Cram.

Tarangere R., Ufiomi, Same. 1 ♂, 2 ♀♀. June 4–July 11.

Belenois mesentina, Cram.

Handeni. 1 ♂. July 23.

Belenois margaritacea, Sharpe.

Ssalanga. 1 ♂. June 9.

Mylothris agathina, Cram.

Ufiomi, Handeni. 6 ♂♂, 5 ♀♀. June 2, 19, July 23. 1 ♂, 4 ♀♀ Ufiomi (plains); 2 ♂♂, 1 ♀ (woodland).

Nychitona medusa f. **alcesta,** Cram.

Ufiomi (woodland). 4 ♂♂, 4 ♀♀. June 2–6.

PAPILIONINAE.

Papilio nireus lyaeus, Doubl.

Differs from true *nireus* in having a much shorter blue spot in area 2 of hind-wing.

New Moshi. 9 ♂♂. May 3.

P. leonidas leonidas, Fab.

One female example, unfortunately without data.

P. dardanus tibullus, Kirb.

♀ f. nov. **lamborni,** Poult.

The single female was captured June 3, 1916, at Ufiomi (woodland). A male was taken in the same locality on June 6; a second on June 9 at Ssalanga, and a third on July 14 at Mabirioni.

The female is an extremely interesting form, being very similar to that described from much further north in Trans. Ent. Soc., 1906, p. 290—a *trophonius* form from the Kikuyu

Escarpment (6500–9000 ft.) near Nairobi, with the pale markings not white but retaining the primitive yellowish tint of *trimeni*, and the broad orange marking incompletely developed, so that it does not quite fill its usual area, the outer end of the fore-wing patch remaining yellowish. It was pointed out in the paper referred to, that this specimen supported the conclusion that *trophonius* had arisen direct from *trimeni* and not indirectly from it by way of *hippocoon*. The existence of another specimen of the same form from a very different locality affords confirmation. The differences between the two specimens are only such as are found between different individuals of each of the female forms of *dardanus*. Thus, the southern specimen from a lower altitude is considerably larger, being just over 90 mm. in expanse as against just under 80 mm.; but a small size is characteristic of both males and females of *dardanus polytrophus* from the high Kikuyu Escarpment. The southern specimen is darker and richer in colouring, but this difference is intensified by its freshness; its hind-wing orange patch is squarer, with a more pronounced angle in area 5, and is more encroached upon by the broader black margin. A vestige of the "tail" involving the lengthening of vein 4 is seen in the northern specimen but not in the southern, just as it is present in some *trimeni*, but not in others.

In the fore-wing the band of black ground-colour between the sub-apical bar and the orange patch on the inner margin is about twice as wide in the southern specimen, and there is also far less invasion of the cell by this orange patch. Furthermore the sub-apical bar and the spot in the cell are fused in the Kikuyu example, quite distinct in the southern. The cell spot itself is double in the latter, single in the former.

In spite of these and other differences both females belong to a characteristic form for which I propose the name *lamborni*. It may be defined as a *trimeni* form in which the yellowish ground-colour of the main area of both wings is replaced, but incompletely in the fore-wing, by orange. The specimen from Ufiomi is probably more typical, and I therefore select it as the type of this female form.

The three males are all of the *tibullus* form with the black discal band of the hind-wing heavily marked, although not so strongly developed as it commonly is in this sub-species. The band of the specimens taken June 6 and June 9 shows in area 5 a marked "costal gap," closed on its outer side by a narrow black V with apex outwardly directed. In the male of July 14 a slight indication of the "anal gap" is represented by a thinning of the black band, from without inwardly, in area 3.

The pattern of these three males together with the geographical distribution of all four specimens shows that this *lamborni* female belongs to the subspecies *tibullus*. The Kikuyu example of this form, on the other hand, belongs to *polytrophus*.

E. B. P.

HESPERIIDAE.

Tagiades flesus, Fab.

Ufiomi (woodland). 1 ♂. June 6.

Cyclopides, sp. ?

One example not yet identified. This specimen is evidently closely allied to *Cyclopides trisignatus*, Neave, from which it differs principally in the total absence of orange spots in the hind-wing.

Ufiomi (woodland). June 6.

XII. *Further notes on recapitulatory attitudes in* Lepidoptera. By T. A. Chapman, M.D.

[Read October 3rd, 1917.]

I have made a few more observations on the methods followed by some Lepidoptera in passing from the attitude of drying their wings after their expansion to their ordinary attitude of rest. The subject is interesting from any point of view, and especially as it points to each species that has a special resting attitude adopting during this period certain positions that are actually, or in some degree recall, the ordinary resting attitude that is not theirs but that of the group to which they belong, or that is most frequent in Lepidoptera.

I have only had opportunity to observe three more species of butterflies. They agree with those reported on last year, in making certain opening and closing wing movements, not after the wings are dry, but during the process of drying; so far as my few observations go nothing of this sort occurs in the Heterocera.

In *P. rapae* this was seen to suggest an effort, which the limpness of the undried wings prevented being successful, to spread the wings flatly, as in the resting attitude of so many Lepidoptera. The other species noticed had similar alternations of opening and closing the wings, but through a much smaller angle that would not suggest an effort to extend them flatly, but for the fact that they were obviously of the same character as in *P. rapae.* Though this curious habit may have some other meaning, none has occurred to me but that mentioned in my previous paper.

With regard to the Heterocera observed, the Geometers follow broadly the same procedure as did those reported in the previous paper, and suggest that the habit they exhibit will obtain in all similar Geometers, that is, similar in having resting positions other than the typical deltoid one. My examples come from each of the three largest sub-families of our British Geometers, so that the habit is in no way of classificatory value. This conclusion is confirmed by finding that precisely the same reminiscence of the typical resting position occurs in the quite unrelated *F. falcataria.*

The detailed notes taken minute by minute during the observations, as I gave them in my first notes on this subject, seem of little value, except as proof that the observations actually were made, so I do not append them, but rather describe the general succession of events in each species, instead of leaving them to be worried out of memoranda made hurriedly during the observations, and not perhaps easily understood, owing to their abbreviated nature, except by myself.

The species observed were—

P. brassicae. The wings expand to a position the same as the normal resting position, that in which most Lepidoptera dry their wings. Almost as soon as one can say expansion is completed, the wings are opened apart to a position in which the fore and hind wings being together, the mid-costae are 8 to 12 mm. apart, and the apices 3 to 8 mm., so that the attitude corresponds to that which in *P. rapae* I have described as bell-shaped; but the separation is so slight in comparison that this attitude would not in *brassicae* suggest any resemblance to the outline of a bell. It is, however, essentially the same, in that the wings being limp the apices approach each other, more than the mid-costae, and are in fact 3 to 8 mm. apart instead of 12 to 20, as they would be if the wings were stiff. They maintain this attitude for about thirty-five seconds and then close, so that the costae are in contact to within 4 mm. of the thorax. They remain so for about forty-five seconds and are again opened to the open position. This alternation is repeated about fourteen or fifteen times. The actual opening and closing takes about ten seconds. The period during which the wings are open is very similar to that during which they are closed, viz. about thirty-five to forty-five seconds. These vary a little in the same specimen and between different specimens, but only by a few seconds. I ought to have said that when open there is the variation of 8 to 12 mm. at mid-costa in different specimens, not in the same specimen, and that 8 mm. at mid-costa corresponds to 3 at apices, 12 mm. to 8 at apices. At the fifth or sixth opening the hind-wing tends to open a little before the fore-wing, separating from them by a millimetre or two in the process. About the seventh or eighth opening, the wings are seen to be stiffer than at first, and the apices are as wide apart as the mid-costae. About the tenth the apices open wider than the mid-costae, the wings being stiffer and holding themselves straighter. About this time the hind-wings tend to be a little separate from the fore-wings when open. Then the fore-wings open but little and the hind-wings rather more. Gradually by about fourteenth opening the hind-wings only open, or the fore-wings hardly perceptibly; gradually the separation of the hind-wings diminishes, and somewhere about the sixteenth to twentieth alternation one may say the process has finished. When closed, the wings at first close very close up to the thorax, their limpness causing no resistance by the further portion of the wings to this approximation; as the wings get stiffer they do not close so far up, only sometimes for a third or half-way from the apex. Later, when the final resting attitude is assumed, they close further up, nearly as far as at the first closing. One or two specimens opened more than the usual 8 or 12 mm., one as much as 20 mm. and might fairly be described as in the bell attitude.

Throughout the process the butterfly at intervals, without reference to the wings being opened or closed, makes a shivering movement, at others rocks to and fro a little—this more frequently on closing the wings, and more frequent in later stages—and makes a few fluttering movements of the wings of an amplitude of about 0·5 mm. All this time the antennae are well separated, much as in the mature butterfly, but are directed slightly behind a line at right angles to the line of the body, which is reached by them about the time the wings finally close, but do not reach the final somewhat porrect position till an hour or more after; their advance to this position is gradual and imperceptible. The hind-wings have the costae nearly level with those of the fore-wings when mature, during the opening and shutting movements they are usually a millimetre or two behind.

We have here, though less obvious, just as in *P. rapae*, an effort to assume the Lepidopterous resting attitude, *i. e.* with the wings flat, but as in *P. rapae* it occurs not after the wings are dry but during their drying, being as it were pushed backwards in the ontogeny.

Pieris napi. The process in *napi* is almost intermediate between those of *rapae* and *brassicae*, the bell attitude results from the wings being depressed to an angle of about 45° (90° between the opposite wings) instead of the 90° of *rapae* or the 15° or 20° of *brassicae*. The details differ a little, but hardly to a degree worth full description.

Chrysophanus dispar. var. *rutilus* emerges about 9.30 a.m. Wings expand very rapidly in from six to ten minutes, they expand to butterfly resting attitude, *i. e.* wings closed dorsally. There then begins a succession of what must be called opening and shutting the wings, though the opening only amounts to a separation of 2 or 3 mm. When closed, the wings (costae) are in contact for four-fifths of their length, when open, though the wings are elsewhere separated, the apices may in some cases meet. They remain closed for about thirty seconds and open for forty-five seconds, but the time varies a little, for about sixteen times in twenty minutes and then for several times more, but so slightly as to be almost doubtful, settling down to the distal two-thirds of the wings touching at the end of half an hour. About the middle of the period the hind-wings open from the fore-wings, so that their tips are 6 or 7 mm. apart during several periods of being open. Various minor details as to movements of proboscis and positions of antennae are not perhaps worth reporting.

Smerinthus populi and *ocellatus* only afforded me three observations; they have a habit, very trying for this purpose, of emerging hardly before and usually a good time after midnight. They expand the wings into the drying attitude, and then gradually and imperceptibly open them, during about half an hour, to the ordinary resting attitude for the fore-wing; the hind-wing is then only partially advanced to show its costa, not more, in fact, than is compelled by its greater width; they project about 7 mm., and it is some time before they advance to show nearly double this width.

It cannot be said, so far as my meagre materials justify, that these species show any attempt to exhibit the normal Lepidopterous resting position.

Falcaria falcataria follows very closely the habits of the Geometers, *Ephyras*, *Acidalias*, etc. It emerges about 5 to 5.30 a.m., rarely or never after 6.30. It expands the wings under an hour, then throws them back into usual drying attitude with a little sudden jerk, remains so for perhaps forty minutes, then gradually lowers them, *i. e.* with no sudden jerk to flat attitude, with inner margins against body, *i. e.* to normal Geometer resting attitude. Some specimens advance the fore-wings gradually and very slowly to the resting attitude of the species, *i. e.* exposing much of the hind-wings; others remain in the triangular position much longer, probably till period of evening flight in most cases.

Phalera bucephala. The resting attitude in most Notodonts is the normal one with the wings in pent-house position. In *bucephala* this is, one may say, exaggerated, so that the wings curl round the body in such a way that the costae of the fore-wings approach each other beneath the insect, and the apices are never more than a few millimetres apart, and may touch if the object on which the moth rests permits or favours this.

The wings expand to a position in which their surfaces form a flat arch over the dorsum, then they are thrown back in the usual way into butterfly attitude. They remain so, drying, for half an hour, and are then deflexed to about the arched position to which they expanded, the surfaces of the fore-wings being at an angle of about 110°, the inner margins in contact and the apices 25 mm. apart. In about an hour the angle of the wing surfaces to each other is 90°, and the apices are only 16 mm. apart. The wings have already a little curvature. In another hour the tips are only 9 mm. apart, and in successive hours they are noted as 6 mm., 4 mm. and 3 mm. apart. Three hours more they are observed to be touching; this movement, from the rather flat pent-house position, to that of the wings being so curled round the body, is gradual, with no actual movement observed at any time, and would appear to depend on the gradual acquirement by certain wing muscles of the necessary tonicity.

H. abruptaria emerges in the afternoon about 4 or 5 p.m. A specimen kept the wings in ordinary Geometer position (triangular) from 5.30 to 7.30, though disturbed once about the middle of this period. Ten minutes later (7.10 p.m.) it had assumed the ordinary resting attitude of the species with the fore-wings advanced.

T. consonaria emerges about 4 p.m. An hour later the wings are expanded and the butterfly attitude taken, and in another half-hour they are deflexed to the ordinary triangular Geometer resting position, which is maintained for at least two hours and probably as a rule till the time of flight, but on earlier disturbance the usual resting position with advanced fore-wings is assumed on resting again. I did not ascertain after how short a period in the triangular position this would occur.

In *Tephroclystis isogrammata* the wings were maintained in the drying (butterfly) attitude only twelve minutes, and were then placed in the Geometrid (deltoid) position. Being disturbed some five minutes later, so that it ran two inches, it settled again in the same attitude. The two costae form an angle of about 100°; an hour later it was about 150°, and in another hour the usual resting position was attained, with costal angle of 190° to 200°, *i. e.* with the wings forward of having the costae in line.

Selenia illustraria. This species differs a good deal from *S. illunaria* in its methods of proceeding from wing expansion to the normal resting position. Though in a warm room, specimens would occasionally be more than half an hour after emergence before any sign of the wings expanding could be detected. The wings then expanded rather rapidly, taking, however, usually about or a little over thirty-five minutes to expand. When expansion is completed the wings hang backwards, but only the tips of the fore-wings touch each other, not indeed always doing so. Then gradually the wings approximate to the butterfly attitude, that is, closely pressed together dorsally, so that the costae are coincident for their distal halves.

The moth selects a vertical or, if possible, a slightly overhanging position in which to expand, so that now they hang downwards, more or less, whilst in this backward position. A special feature is that this dorsal position is gradually attained by quite imperceptible movement, and this peculiarity continues throughout the whole evolution from the beginning of expansion to the attainment of the normal resting position; there is no sudden movement as is so common, either of throwing the wings back, or assuming the resting position. This closing backwards is attained in ten or fifteen minutes after expansion is completed; the wings are kept so for about twenty minutes and then are gradually separated in a minute or two till the costa of fore-wings are separated to an angle of 10° or 15°; the separating movement is continued in the same gradual, hardly noticeable manner, till in about two more minutes the angle is 60°, in two more 90°, and in two or three more finally 100° or 110°. Usually the process is rather slower, and varies a good deal in its rapidity at different stages. In the position of the moth, gravity no doubt tends to make the wings hang directly backwards; nevertheless, the position of the wings at this stage is with the costae of the anterior wings at an angle with each other of about

120°, and of the flat surfaces of the wings of about 140°; the costae not being so far advanced as to be in a plane transverse to the line of the insect body, but behind this in a plane that slopes backwards from it at a considerable angle. This position, which appears to represent the memory of the normal (triangular) resting attitude of Geometers, may last about thirty minutes, and in another thirty minutes the wings close again dorsally to a costal angle of about 45°. At this point the costae of the fore- and hind-wings on either side are nearly coincident.

In the same gradual imperceptible way in which the other movements occur, the fore-wings advance from the hind-wings. Measured from costa to costa at the post-discal line it takes about two hours for the fore-wings to be 3 mm. in advance of the hind-wings, the fore- and hind-wings being still in the same plane. Then, still very gradually, the fore-wings assume the curious bend in a line below vein 2 that characterises the ordinary resting attitude of the species, the inner part of the wing being in the same plane with and close against the hind-wing, the greater (costal) portion being raised at a considerable angle. At the end of another hour one may think this attitude is attained, at the end of two one has no doubt it is. All the progress and the movements involved are so gradual and imperceptible that it is difficult to divide them into stages and say when each is complete.

Illustraria emerges in the morning about 6.30 to 7.30 a.m.

Ennomos lunaria. The wings are thrown back when expanded, and some ten minutes later and when apparently dry are opened gradually, so that in about six minutes they nearly approach a flat position, instead of 180° (flat), between the two fore-wings they are about 160° or 170°. In some ten minutes the angle diminishes to that of normal resting, perhaps 80°, but there is still no angulation of fore-wing, and the hind-wing is only 3 or 4 mm. behind fore-wing. The complete resting attitude with fore-wing advanced and with the longitudinal fold is not attained till an hour or two later. I see that in one specimen I noted the wings were opened till quite flat; in another they did not get quite as far, but I did not note the angle. The costae of fore-wings made an angle of 90°, but the wing surfaces were much more.

Fidonia piniaria emerges 6 to 8 a.m. The wings expand to the dorsal (butterfly) position in about twenty minutes; in about ten minutes more they are gradually separated, so that in two or three minutes the wings are separated so that the apices are some 18 mm. apart, the angle between the wings being about 40°. They remain thus for about six or seven minutes, the wings appearing to be quite dry and stiff. They then gradually close, at the rate of about 1 mm. (for each wing) a minute, and in ten or twelve minutes the butterfly attitude (the normal resting attitude of *piniaria*) is reached, to appearance, but they are not tightly closed for ten or twenty more minutes. The whole process is gone through very rapidly (compared with most other species). After the wings are dry they are separated, but not widely, so that the reminiscence of the flat deltoid attitude, though still present, is comparatively brief and slight. The process reminds one of that obtaining in the butterflies, but the important difference is that it takes place after, not during drying; also, of course, it is one, not a succession of movements.

S. illunaria and *F. piniaria* both have a normal resting attitude similar to that of the butterflies, with the wings raised over the back; but the reminiscence of the ordinary Geometrid attitude which they display, in the interval between the completion of the drying of the wings and the assumption of their resting attitude, two attitudes that are identical and that one would expect to find continuous, is curiously different in the two species. In both species, however, the reminiscence is there.

In the *Études de Lépidoptérologie Comparée*, Fasc. V (II), p. 115, Mr. H. Powell records how *Syrichthus mohammed*, Obthr., having expanded its wings in the closed ("butterfly") attitude, depresses them to the Geometrid or triangular position, and gives photographs on Pl. Hj, Fasc. VI and Pl. Hb, Fasc. V (II) and of *S. proto* on Pl. 27, Fasc. VII. He says this position is kept for only a short period. In complete repose the wings are closed in butterfly attitude; when basking, the depressed wings have the costae at right angles to the body; when resting briefly the fore-wings are well raised. This merely summarises a valuable demonstration that the recapitulatory attitude is very manifest in *Syrichthus*. In this habit the "Skipper" appears to be nearer the *Heterocera* than to the butterflies.

XIII. *A Preliminary Catalogue of British* Cecidomyidae (Diptera) *with special reference to the Gall-midges of the North of England.* By Richard S. Bagnall, F.L.S., and J. W. Heslop Harrison, D.Sc.

[Read May 2nd, 1917.]

For many years the *Cecidomyidae*, a family of Diptera, familiar enough to naturalists in a cursory sort of way (because it embraces the little flies known as "Gall-midges"), has been neglected by British entomologists, in spite of its extent and great economic importance.

Of its members a considerable proportion are purely gall-causers, each producing its particular gall on its host-plant or plants. These galls are characteristic of the species and are therefore part of its specific characters, but, unlike many such distinctions, they can be thoroughly relied upon as a means of determining the species. They are not, as many entomologists unacquainted with their stability think, unworthy of consideration; such an opinion simply displays ignorance on the part of its holder.

Any one taking up the study of the group in real earnest will soon find that many do not fall into the category of genuine gall-makers. Their modes of life are exceedingly varied, and thereby render the subject the more interesting. Some feed as larvae under bark, in decaying wood, in stems of grasses, sedges, fungi and mosses; others, again, find their food in epiphytic fungi such as rusts, smuts and mildews. We find still more figuring as commensals and inquilines in the galls of *Cynipidae*, Gall-midges and other insects, and also of the Gall-mites (*Eriophyidae*), whilst others have larvae ecto-parasitic or predatory on *Aphididae*, and Eriophyid and other mites. Of the remainder, a small number are Endoparasites, the larvae living in the abdomens of certain Hemiptera (*Aphididae*, *Psyllidae* and *Tingidae*).

Some of the *Lestreminae*, like those of the genus *Miastor*, reproduce their kind by paedogenesis, and are of extreme importance in biology as suitable subjects for studying the early segregation of germ-cells.

There is no excuse for our naturalists to continue this systematic neglect of the group. Houard (1908–1913) includes descriptions of all the then-known Cecidomyid galls of the western section of the Palaearctic area in his great work on the Zoocecidia. Furthermore, there has been in recent years a steady flow of literature as the result of the researches of continental entomologists such as Kieffer, Trotter, Tavares and Rübsaamen. The first-named author's monograph in Wytsman's "Genera Insectorum" (fasc. 152), which appeared in 1913, will, with the fine productions of Dr. Felt, in America, form the groundwork of much further work. Lastly, an Italian periodical, "Marcellia," edited by Prof. Trotter, keeps one up to date with new researches.

It will thus be seen that in the *Cecidomyidae* we have a group not only displaying abundant and varied interest in its biology, but one provided with a literature unusually rich for a "neglected order."

During the past three seasons we have devoted much of our leisure in this fascinating study and with considerable success. We have therefore been tempted to publish the present list as a record of our labours and as a basis for future work and workers. We have included references to (*a*) original descriptions of genera and species, (*b*) Kieffer's 1913 Monograph, and (*c*) to Swanton and Houard as far as Gall-midges are concerned, quoting only the authors' numbering of the gall. In addition we have appended an index to the host-plants. Owing to the fact that Connold's works on galls are very far from complete, and also because Swanton supersedes them, we have not deemed it necessary to refer to that author.

Soon we hope to prepare a book on British Zoocecidia, and later, when we have bred out and studied, as far as our limitations will allow, the life histories of the insects, we shall, in all probability, proceed with a more elaborate monograph of the Cecidomyids. It is, then, for these reasons that we characterise this as a "preliminary" list.

The species noted from the north of England, *e. g.* from the counties of Northumberland, Durham, Cumberland, Westmoreland, Lancashire, Cheshire and Yorkshire, are shown in heavy type. Species not yet reported from that area are shown in italics, whilst those ascribed to older authors and requiring confirmation (see italicised names in Collin, 1904) are enclosed in square brackets. Although most of Walker's species are capable of being correctly assigned to Kieffer's genera, as species they are insufficiently defined and thus unrecognisable by students; they are therefore neglected here.

By keeping in close touch with each other we have been able to duplicate the records of very many of the most interesting occurrences; in fact, the wealth of records is a welcome feature. Except where a name is added all records are our own; outside the Northumberland and Durham area the first-named author is almost entirely responsible for the records from Lancashire and Cheshire (see Bagnall, 1917–1), and the few from Cumberland and Westmoreland, and from Redcar and Leeds, whilst the second-named author is similarly responsible for the Cleveland area, Yorkshire. We also add Mr. Burkill's Yorkshire records (Burkill, 1916, 1917).

An asterisk in the main list denotes species not shown in the lists of Collin, 1904, and Swanton, 1912.

CONTENTS

I. Classified List of British *Cecidomyidae* with North of England Records.

Subfamily *CECIDOMYINAE.*

Group Lasiopterariae.

Clinorrhyncha H. Loew, 1850, p. 21.

*1. **C. chrysanthemi** H. Loew, 1850, p. 39; Kieffer, 1913–2, p. 19.

Affecting achenes of *Matricaria inodora* and *Anthemis Cotula.* See Houard, 5722 and 5665.

Records from all counties excepting Westmoreland.

*2. **C. millefolii** Wachtl, 1884, p. 161; Kieffer, 1913–2, p. 20.

Affecting achenes of *Achillea Millefolium* and more rarely *A. Ptarmica*. See Houard, 5672 and 5701.

More sparing than *C. chrysanthemi*; records from all counties excepting Lancashire and Westmoreland.

*3. **C. leucanthemi** Kieffer (*chrysanthemi* Schiner *non* H. Loew), 1889–1, p. 285; Kieffer, 1913–2, p. 20.

Affecting achenes of *Chrysanthemum Leucanthemum*. Houard, 5726.

NORTHUMBERLAND, Whitfield. DURHAM, Birtley district, Fatfield. Also from Scotland.

Trotteria (for *Choristoneura* (praeocc.) Rübs.) Kieffer, 1901–1, p. 561.

*4. **T. galii** Rübsaamen, 1912–1, p. 376; Kieffer, 1913–2, p. 22.

Gall on *Galium verum*, = Cecidomyid sp., Houard, 5290.

LANCASHIRE, several, in a field near Ainsdale. NORTHUMBERLAND, Bamburgh and Warkworth, not rare. DURHAM, Blackhall Rocks, three examples only. Also from Scotland.

*5. **T. sarothamni** Kieffer, 1890–1, p. 136 (Lasioptera); Kieffer, 1913–2, p. 22.

Galling seed-pods of broom. Houard, 3411.

NORTHUMBERLAND, near Ovingham; and DURHAM, Gibside; rare, lane between Rowley and Lanchester; Birtley.

*5A. **T. umbelliferarum** Kieffer, 1913–1, p. 47; 1913–2, p. 22.

On *Anthriscus*.

DURHAM, Gunnergate.

Lasioptera Meigen, 1818, p. 88.

6. *L. albipennis* Meigen, 1804, p. 40 (*Cecidomyia*); Kieffer, 1913–2, p. 31.

7. **L. arundinis** Schiner, 1854, p. 175; Kieffer, 1913–2, p. 31.

Galling *Phragmites communis*. Swanton, 49; Houard, 241.

NORTHUMBERLAND, Warkworth. DURHAM, Billingham.

*8. **L. calamagrostidis** Rübsaamen, 1893, p. 164; Kieffer, 1913–2, p. 31.

On *Phalaris arundinacea.*

NORTHUMBERLAND, Warkworth. DURHAM, Birtley and Gibside.

*9. **L. carophila** F. Loew, 1874, p. 149; Kieffer, 1913–2, p. 31.

Abroad this midge galls many species of Umbelliferae.

DURHAM, Wolviston on *Anthriscus*, and Penshaw Hill on *Pimpinella Saxifraga*. Not recorded from the *Anthriscus* in Houard.

10. **L. rubi** Heeger, 1851, p. 203; Kieffer, 1913–2, p. 32.

Galling stems of *Rubus*. Swanton, 478, 483 and 489; Houard, 2964, 2976 and 3024.

NORTHUMBERLAND, Warkworth, not uncommon. DURHAM, on bramble, Ryhope; Tinkler Fell; Birtley. YORKSHIRE, Nunthorpe.

*11. **Lasioptera** sp. Rübsaamen; Schlechtendal.

Molinia caerulea, stem. Houard, 251.

DURHAM, near Lanchester.

Baldratia Kieffer, 1897–3, p. 6; 1913–2, p. 24.

*12. **B. salicorniae** Kieffer, 1897–3, p. 7; 1913–2, p. 26.

On *Salicornia radicans*. See Houard, 2240.

DURHAM, Greatham.

Stefaniella Kieffer, 1898–2, p. 55; 1913–2, p. 28.

*13. **S. brevipalpis** Kieffer, 1898–2, p. 53; 1913–2, p. 29.

On *Atriplex* (*Obione*) *portulacoides*. Houard, 2224.

DURHAM, Greatham.

Group OLIGOTROPHARIAE.

[**Neocerata** Coquillett, 1900, p. 47.†

*13A. [**N. rhodophaga** Coquillett, 1900, p. 47; Kieffer, 1913–2, p. 41.

† Felt sinks this as a synonym of *Dasyneura* (= *Perrisia*).

NORTHUMBERLAND, examples taken in the buds of cultivated roses at Ninebanks are possibly referable to this species.

Rhopalomyia Rübsaamen, 1892, p. 370.

14. **R. millefolii** (*achilleae* Inchb. 1860) H. Loew, 1850, p. 37 (*Cecidomyia*); Kieffer, 1913–2, p. 44.

Galls on *Achillea Millefolium* and more rarely on *A. Ptarmica*. Swanton, 815, 816, 817, 818 and 823, 824; Houard, 5673, 5680, 5685, 5691.

NORTHUMBERLAND and DURHAM, sparingly but widely distributed. LANCASHIRE, once only, near Ainsdale.

15. **R. tanaceticola** Karsch, 1879, p. 27 (*Oligotrophus*); Kieffer, 1913–2, p. 44.

Somewhat similar galls on *Tanacetum vulgare*. Swanton, 830, 831, 832; Houard, 5750, 5752, 5754.

NORTHUMBERLAND, near Chathill; Warkworth. DURHAM, several records for the Wear and Team valleys.

Misopatha Kieffer, 1913–1, p. 48.

*16. **M. florum** Kieffer, 1890–2, p. 37 (*Cecidomyia*); Kieffer, 1913–2, p. 45.

On *Artemisia vulgaris*. Houard, 5817.

DURHAM, between Lambton and Cox Green; Greatham and Port Clarence.

17. **M. foliorum** H. Loew, 1850, p. 36 (*Cecidomyia*); Kieffer, 1913–2, p. 45.

On *Artemisia vulgaris* and *Abrotanum*. Collin (1904, p. 94) places *abrotani* of Trail (1886, p. 250) as a synonym of this species. Swanton, 834; Houard, 5824.

NORTHUMBERLAND, Budle Bay. DURHAM, Billingham; Birtley.

18. **M. ptarmicae** Vallot (*florica* Winn), 1849, p. 98 (*Cecidomyia*); Kieffer, 1913–2, p. 46.

On *Achillea Millefolium* and *A. Ptarmica*. Swanton, 813, 814 and 822; Houard, 5676, 5681 and 5706.

Sparingly, all counties excepting Cheshire.

*19. **M. syngenesiae** H. Loew, 1850, p. 39 (*Cecidomyia*); Kieffer, 1913–2, p. 46.

On *Anthemis Cotula* and *Matricaria inodora*. Houard, 5666 and 5723.

Apparently widely distributed; records from all counties.

Arceuthomyia Kieffer, 1913–1, p. 49.

*20. **A. valerii** Tavares, 1906, p. 299 (*Rhopalomyia*); Kieffer, 1913–2, p. 48.

On *Juniperus communis*. Houard (supplement), 6277 (see H. 135).

Lancashire and Westmoreland, Hampsfell and Meathop Fell near Grange-over-Sands. The species was originally described from the Mediterranean on *Juniperus oxycedrus*, but in 1912 Cotte recorded it from France on the common Juniper.

Oligotrophus Latreille, 1805, p. 288.†

21. **O. juniperinus** Linné, 1758, p. 588; Kieffer, 1913–2, p. 49.

On *Juniperus communis*. Swanton, 11; Houard, 129.

Durham, near Chester-le-Street. Lancashire and Westmoreland, Grange-over-Sands district.

*22. **O. panteli** Kieffer, 1898, p. 18; Kieffer, 1913–2, p. 49.

On *Juniperus communis*, known throughout Europe. Houard, 126.

Lancashire and Westmoreland, Grange-over-Sands district, locally common.

*23. **Oligotrophus** sp. Rübsaamen and others.

On *Juniperus communis*. Houard, 125.

Lancashire, Hampsfell near Grange-over-Sands, rare.

*24. **O. alopecuri** Rent., 1895, p. 3; Kieffer, 1913–2, p. 50.

In seeds of *Alopecurus pratensis*.

Cheshire, Chester. Miss Ormerod, 1885, p. 32. See Supplemental Note, Collin, 1904, p. 97. Northumberland and Durham, locally common.

† *O. juniperinus*, *O. panteli* and another Juniper species truly belong to this genus as now limited, but all other species are placed here temporarily pending further research.

25. **O. bursarius** Bremi, 1847, p. 52 (*Cecidomyia*); Kieffer, 1913–2, p. 50.

Galling leaves of *Glechoma hederacea*. Swanton, 706; Houard, 4809.

Records from all counties.

*26. **O. fagineus** Kieffer, 1909, p. 7 (gall); 1913–2, p. 50.

Leaves of *Fagus*, parenchymatous gall, = Cecidomyid. Houard, 1156.

NORTHUMBERLAND, rare, Warkworth. DURHAM, Lambton; Gibside. YORKSHIRE, Leeds.

*27. **Oligotrophus** sp. Rübsaamen, Trotter.

A very distinctive gall on beech leaves, previously only known from Russia and Asia Minor. Houard, 1157.

NORTHUMBERLAND, Ninebanks (Rev. J. E. Hull).

*28. **O. hartigi** Liebel, 1892, p. 283 (*Hormomyia*); Kieffer, 1913–2, p. 50.

Leaves of *Tilia*, parenchymatous gall; local.

NORTHUMBERLAND, Warkworth and Ovingham, sparingly. DURHAM, Gibside, local; Castle Eden Dene. CUMBERLAND, near Alston. LANCASHIRE, Grange-over-Sands. YORKSHIRE, Leeds.

*28A. **O. loewianus** Kieffer, 1909, p. 4; 1913–2, p. 50.

On *Carex arenarius*.

NORTHUMBERLAND, Warkworth.

*29. **O. reaumurianus** F. Loew,† 1878, p. 387 (*Hormomyia*); Kieffer, 1913–2, p. 50.

An interesting gall on leaves of *Tilia* spp.

YORKSHIRE, Gunnergate, on one tree only. Also recorded by Mr. Burkill from W. Gloucestershire.

*30. **O. tympanifex** Kieffer, 1909, p. 6 (gall); 1913–2, p. 50.

In leaves of *Corylus*, parenchymatous gall, = Cecidomyid, Houard, 1061.

Local, though apparently widely distributed; records from all counties.

† Referable to the genus *Didyomyia* Rübsaamen, characterised by Kieffer as insufficiently described.

*31. **O. ulmi** Kieffer, 1909, p. 31 (gall and larva); 1913–2, p. 50.

In leaves of *Ulmus campestris* and *U. montana*, parenchymatous gall, = Cecidomyid, Houard, 2046 and 2064.

Also widely distributed; records from all counties excepting Westmoreland. Very plentiful in 1917.

Phyctidobia Kieffer, 1912–1, p. 220.

32. *P. solmsi* Kieffer, 1906, p. 179 (*Oligotrophus*); 1913–2, p. 51.

Galls on leaves of *Viburnum Lantana*. Swanton, 774; Houard, 5349.

Mikomyia Kieffer, 1912–2, p. 2.

*33. **M. coryli** Kieffer, 1901–2, p. 22 (*Oligotrophus*); 1913–2, p. 52.

On leaves of *Corylus*. Houard, 1060.

Rare; records from all counties excepting Westmoreland.

Semudobia Kieffer, 1913–1, p. 55.

*34. **S. betulae** Winnertz, 1853, p. 234 (*Cecidomyia*); Kieffer, 1913–2, p. 52.

Galling fruit of *Betula*. Houard, 1067. Note: Swanton suggests that the species recorded by Binnie and Connold (= Cecidomyid, Houard, 1068) may be this species. The following records excepting one are of Houard, 1067.

Northumberland, Crag Lough (H. 1068). Durham, several records. Lancashire, Freshfield. Cheshire, Bidston. Yorkshire, Eston.

Iteomyia Kieffer, 1913–1, p. 55.

35. **I. capreae** Winnertz, 1853, p. 291 (*Cecidomyia*); Kieffer, 1913–2, p. 55.

Leaves of *Salix Caprea* and others.

Not uncommon; records from all counties.

*36. **I. major** Kieffer, 1898–2, p. 22 (*Olig. capreae*, var. *major*); 1913–2, p. 55.

Rarer than *capreae*; our records are from *Salix aurita* only.

DURHAM, Waldridge, Hart and Easington; rare. LANCASHIRE, Ainsdale. YORKSHIRE, Redcar; Leeds district.

Janetiella Kieffer, 1898–2, p. 23.

37. **J. lemeei** Kieffer, 1904, p. 71 (*Oligotrophus*); 1913–2, p. 59.

Gall on midrib and nerves of *Ulmus montana*. Swanton, 300; Houard, 2061. A very local species.

NORTHUMBERLAND, Stocksfield and Ovingham (H. S. Wallace); Warkworth. DURHAM, Winlaton Mill; dene near Fencehouses; Urpeth. LANCASHIRE, Grange-over-Sands. YORKSHIRE, Bardsey, near Leeds.

Specimens were taken at Warkworth on *U. campestris* and *U. suberosa* also.

*38. **J. thymi** Kieffer, 1888, p. 100 (*Cecidomyia*); 1913–2, p. 59.

On *Thymus*. Houard, 4912 and 4917.

Records from all counties excepting Cheshire and Yorkshire.

*39. **J. thymicola** Kieffer, 1888, p. 102 (*Cecidomyia*); 1913–2, p. 59.

Also on *Thymus*, gall like preceding, but pilose. Houard, 4921.

NORTHUMBERLAND, Seahouses, Warkworth, Crag Lough. DURHAM, near Sunderland, rare. LANCASHIRE and WESTMORELAND, Grange-over-Sands district. Also from Scotland.

*40. **J. tuberculi** Rübsaamen, 1889, p. 61.†

Galling stem of broom (*Sarothamnus*). Houard, 3424.

NORTHUMBERLAND and DURHAM, Derwent banks between Espershields and Edmundbyers; and DURHAM, in a lane between Newbiggin and Rowley, not common.

*41. **Janetiella** sp. Bagnall and Harrison, 1917–2, p. 207.

On *Thymus*.

DURHAM, Stanhope and Penshaw Hill.

† We have not yet traced this in Kieffer, 1913–2, unless it is the *Perrisia tuberculi* Rübs.

Zygobia Kieffer, 1913–1, p. 55.

42. *Z. carpini* F. Loew, 1874, pp. 157 and 322 (*Cecidomyia*); Kieffer, 1913–2, p. 60.

Galling leaf of *Carpinus*. Swanton, 211; Houard, 1045.

Craneiobia Kieffer, 1913–1, p. 55.

43. *C. corni* Giraud, 1863, p. 1301 (*Cecidomyia*); Kieffer, 1913–2, p. 60.

Gall on *Cornus sanguinea*. Swanton, 672; Houard, 4543.

Phegobia Kieffer, 1913–2, p. 61.

*44. **P. tornatella** Bremi, 1847, p. 13 (*Cecidomyia*); Kieffer, 1913–2, p. 61.

A glabrous gall (like that of the common *Hartigiola annulipes*) on the upper surface of leaf of *Fagus*, = Houard, 1154.

NORTHUMBERLAND and DURHAM, several records. CUMBERLAND, Alston.

Mayetiola Kieffer, 1896–1, p. 89.

*45. **M. avenae** Marchal, 1895, p. 272 (*Cecidomyia*); Kieffer, 1913–2, p. 62.

Gall, stem of *Avena fatua*. See Houard, 223 (*Avena sativa*).

YORKSHIRE, Nunthorpe.

*46. **M. dactylidis** Kieffer, 1896–2, p. 217; 1913–2, p. 62.

Gall, stem of *Dactylis glomerata*. Houard, 258.

DURHAM, banks of the Wear near Penshaw.

47. **M. destructor** Say, 1817, p. 45 (*Cecidomyia*); Kieffer, 1913–2, p. 62.

On *Hordeum vulgare*. Houard, 346.

DURHAM, Penshaw.

48. **M. holci** Kieffer, 1896–2, p. 333; 1913–2, p. 62.

On *Holcus lanatus*, stem. Swanton, 46; Houard, 215.

NORTHUMBERLAND, Seahouses, once only; Warkworth. DURHAM, Birtley, Gibside, Edmondsley. LANCASHIRE, Lathom.

*49. **M. joannisi** Kieffer, 1896–2, p. 116; 1913–2, p. 62.

Gall, stem of *Poa nemoralis.* Houard, 263.

NORTHUMBERLAND, Warkworth. DURHAM, between Wolviston and Billingham. LANCASHIRE, Grange-over-Sands.

*50. **M. ventricola** Rübsaamen, 1899, p. 566 (*Oligotrophus*); Kieffer, 1913–2, p. 62.

On *Molinia caerulea.* Houard, 249.

NORTHUMBERLAND, between Whitfield and Langley. LANCASHIRE (Grimshaw). YORKSHIRE, on all the Cleveland moors.

*51. **M. hordei** Kieffer, 1909, p. 9 (gall) †; Kieffer, 1913–2, p. 62.

On *Hordeum vulgare,* = Cecidomyid, Houard, 347.

DURHAM, between Vigo and Birtley.

*52. **Mayetiola** sp. Bagnall and Harrison, 1917–3, p. 228.

On *Bromus erectus.*

DURHAM, Gibside.

Chortomyia Kieffer, 1913–2, p. 63.

53. **C. hellwigi** Rübsaamen, 1912, p. 217 (*Poomyia*); Kieffer, 1913–2, p. 63.

On stems, *Brachypodiums sylvaticum,* = Cecidomyid, Swanton, 62, and Houard, 297.

NORTHUMBERLAND, Warkworth, local. DURHAM, Penshaw, Ryhope, Easington, and Horden, locally common. LANCASHIRE, Grange-over-Sands, probably not rare. YORKSHIRE, Leeds district.

*54. **C. moliniae** Rübsaamen, 1895, p. 180 (*Oligotrophus*); Kieffer, 1913–2, p. 63.

On *Molinia caerulea.* Houard, 250.

DURHAM, Birtley Fell. CHESHIRE, Bidston Hill.

55. **C. poae** Bosc., 1817, p. 133 (*Cecidomyia*); Kieffer, 1913–2, p. 63.

On *Poa nemoralis.* Swanton, 56; Houard, 264.

† The generic position of this species is not yet certain.

Northumberland, Warkworth. Durham, Penshaw, Birtley, Gibside. Cumberland, Alston. Lancashire, Grange-over-Sands.

*56. **C. radicifica** Rübsaamen, 1895, p. 179 (*Oligotrophus*); Kieffer, 1913–2, p. 63.

On *Poa nemoralis*. Houard, 265.

Northumberland, Ovingham and Langley Woods (H. S. Wallace). Durham, Ryhope (H. S. Wallace); Penshaw and Blackhall Rocks. Cumberland, Nenthead (H. S. Wallace).

Cystiphora Kieffer, 1892, p. 212.

*57. **C. hieracii** F. Loew, 1874, p. 145 (*Cecidomyia*); Kieffer, 1913–2, p. 64.

On *Hieracium* sp., apparently very rare.

Durham, Hylton. Lancashire, Ainsdale, and Westmoreland, Ravenstondale.

*58. **C. taraxaci** Kieffer, 1888, p. 98; 1913–2, p. 64.

On *Taraxacum officinale*, very local and rare. Houard, 6090.

Northumberland, coast near Bamburgh; Warkworth. Durham, Blackhall Rocks; Penshaw, once only. Cumberland, Alston. Lancashire, Grange-over-Sands, once only.

*59. **C. leontodontis** Kieffer, 1909, p. 14 (gall); 1913–2, p. 64.

On *Leontodon hispidum*. Houard, 6053.

Northumberland, Warkworth. Durham, very local, Penshaw and Washington.

*60. **C. pilosellae** Kieffer, 1892, p. 213; 1913–2, p. 64.

On *Hieracium Pilosella*. Houard, 6207.

Very local; records from all counties excepting Cheshire.

61. **C. sonchi** F. Loew, 1875, p. 18 (*Cecidomyia*); Kieffer, 1913–2, p. 64.

On *Sonchus arvensis*. Swanton, 880; Houard, 6100.

Northumberland, abundant in N.E. Northumberland; Ovingham. Lancashire, Ainsdale, one plant only. Also Stirlingshire, very common.

*62. **Cystiphora** sp. Bagnall and Harrison, 1916 (iv), p. 248.

On *Hypochoeris radicata*. Apparently a new species.
NORTHUMBERLAND, Warkworth. DURHAM, Penshaw and Edmondsley. CUMBERLAND, Alston.

Macrolabis Kieffer, 1892, p. 214.

63. **M. corrugans** F. Loew, 1877, p. 11 (*Cecidomyia*); Kieffer, 1913–2, p. 66.

(*a*) On *Heracleum Sphondylium*. Swanton, 667; Houard, 4512.
In all counties; common.

(**b*) On *H. Sphondylium*, var. *angustifolium*.
LANCASHIRE and WESTMORELAND, Grange-over-Sands district.

(**c*) On *Lamium album*. Houard, 4840.
NORTHUMBERLAND, Warkworth and Ovingham. LANCASHIRE, Lathom. DURHAM, Biddick; Lambton Park and Blaydon.

(**d*) On *Stachys sylvatica*.
DURHAM, Penshaw.

This species is recorded by Houard from six different Umbels and from three species of *Lamium*. Swanton (870) (ref. Connold) records it also from *Hieracium boreale*, but this is almost certain to be *M. hieracii*.

*64. **M. hieracii** Kieffer, 1888, p. 112.†

Recorded by Houard from *Hieracium boreale*, *H. umbellatum* and other species of *Hieracium*. Apparently the species (see above) recorded from *H. boreale* as *M. corrugans* by Connold (Swanton, 870).
DURHAM, Hylton. LANCASHIRE, on *Hieracium* sp., Birkdale.

*65. **M. hippocrepidis** Kieffer, 1898–2, p. 59; 1913–2, p. 66.

On *Hippocrepis comosa*. Houard, 3683.
WESTMORELAND, Meathop Fell, near Grange-over-Sands in October, gall only, too late for larvae.

† We have as yet been unable to trace this in Kieffer, 1913–2.

*66. **M. marteli** Kieffer, 1892 (-1), p. 215; 1913-2, p. 66.

On *Hypericum hirsutum.*
DURHAM, Middleton-one-Row.

67. **M. pilosellae** Binnie, 1877, p. 179 (*Cecidomyia*); Kieffer, 1913-2, p. 66.

On *Hieracium Pilosella.* Swanton, 863; Houard, 6199. Records from all counties excepting Cheshire; local.

*68. **M. stellariae** Liebel, 1889, p. 282 (*Cecidomyia*); Kieffer, 1913-2, p. 66.

On *Stellaria graminea.* Recorded by Houard from *Stellaria media.*
DURHAM, Birtley.

Arnoldia Kieffer, 1895, p. 7.

*69. **A. quercicola** Kieffer, 1909, p. 21 (gall and larva); 1913-2, p. 67.

On *Quercus.* Houard, 1211.
NORTHUMBERLAND, near Whitfield. DURHAM, near Fatfield.

70. *A. quercus* Binnie, 1877, p. 179 (*Cecidomyia*); Kieffer, 1913-2, p. 67.

On *Quercus.*

*71. **Arnoldia** sp. Kieffer; Lemée.

On *Quercus.* Houard, 1212.
DURHAM, West Cornforth.

Geocrypta Kieffer, 1913-2, p. 68.

*72. **G. braueri** Handlirsch, 1884, p. 135 (*Cecidomyia*).

A root-gall on *Hypericum pulchrum*; recorded by Houard (4213) from *H. perforatum* only. Apparently very local.
NORTHUMBERLAND, near Staward. DURHAM, near Lanchester.

Rhabdophaga Westwood, 1847, p. 588.

*73. **R. albipennis** H. Loew, 1850, p. 35 (*Cecidomyia*); Kieffer, 1913-2, p. 70.

On *Salix* spp. Houard, S. 32.

Apparently not uncommon; records from all counties excepting Westmoreland. Also recorded by Mr. Burkill from Derbyshire, and from Scotland.

*74. **R. clavifex** Kieffer, 1892–2, p. 441 (*Cecidomyia*); 1913–2, p. 70.

On *Salix* spp. Houard, S. 14.
LANCASHIRE, Ainsdale, rare.

*75. **R. dubiosa** Kieffer n. nov. for *Cecidomyia dubia* Kieffer, 1892–2, p. 255; 1913–2, p. 70 (= *Cecidomyia griseicollis* Zett. *non* Meigen).

On *Salix* spp. Houard, S. 41.
NORTHUMBERLAND, Ninebanks, Warkworth. DURHAM, Waldridge. LANCASHIRE, near Ainsdale.

*76. **R. giraudiana** Kieffer (*saliciperda* Giraud *non* Dufour), 1898–1, p. 159; 1913–2, p. 70.

On *Populus alba*; also known from *P. tremula* abroad. Houard, 475.
LANCASHIRE, Ainsdale and Freshfield, only two examples.

77. **R. heterobia** H. Loew (*saligna* Hardy), 1850, p. 28 (*Cecidomyia*); Kieffer, 1913–2, p. 70.

On *Salix* spp. Houard, S. 10; Swanton, 88, 89 and 154.
NORTHUMBERLAND, Warkworth, on *S. alba*. DURHAM, Birtley, on *S. repens*, also affecting the male catkins; Waldridge, Swalwell; Tinkler Fell, on *S. Caprea*. LANCASHIRE, Birkdale and Ainsdale.

*78. **R. iteobia** Kieffer, 1890–3, p. 201 (*Cecidomyia*); 1913–2, p. 70.

On *Salix cinerea*. Houard, S. 11, *Perrisia iteobia*.
NORTHUMBERLAND, Ninebanks. DURHAM, near Blanchland. LANCASHIRE, Ainsdale. Also from Scotland.

*79. **R. karschi** Kieffer, 1892–2, p. 251 (*Cecidomyia*); 1913–2, p. 70.

On *Salix* spp. Houard, S. 34.
NORTHUMBERLAND, Ninebanks, on *S. cinerea*, and Warkworth, on *S. cinerea* and *alba* var. DURHAM, Birtley,

on *S. repens*, rare. LANCASHIRE, Freshfield, on *S. cinerea*, rare. Also recorded by Mr. Burkill (on *S. alba*) from Derbyshire.

80. **R. marginemtorquens** Winnertz, 1853, p. 223 (*Cecidomyia*); Kieffer, 1913–2, p. 70.

On *Salix* spp. Houard, S. 51, *Perrisia marginemtorquens*. Generally distributed; records from all counties excepting Westmoreland and Cheshire.

*81. **R. nervorum** Kieffer (*noduli* Rübs.), 1895–2 (*Dichelomyia*); 1913–2, p. 71.

On *Salix* spp. Houard, S. 49.

DURHAM, River Wear near Cox Green, on *S. alba*, Gibside on *S. aurita*, and Ryhope on *S. fragilis*, rare. LANCASHIRE, Ainsdale and Freshfield, local, on young *S. alba*. NORTHUMBERLAND, Ovingham and Warkworth, on *S. cinerea*, *S. alba* and the var. *vitellina*. YORKSHIRE, Nunthorpe on *S. vitellina*, also see Burkill, 1916, "Entomologist," p. 7, on *S. Caprea*. Also recorded by Mr. Burkill from Derbyshire on *S. alba* and *S. cinerea*, and from Surrey on *S. Caprea*.

*82. **R. pierrei** Kieffer, 1896–2, p. 218 (*Bertieria*); 1913–2, p. 71.

On *Salix repens* and *S. cinerea*, rare. Houard, S. 37.

NORTHUMBERLAND, near Warkworth. DURHAM, Birtley, rare.

*82A. **R. pseudococcus**, Rübsaamen 1890–2, p. 307 (*Cecidomyia*); Kieffer 1913–2, p. 71.

Flat, broad larva under a scale-like covering on underside of leaves of *Salix Caprea*, gregarious.

DURHAM. Plentiful on isolated trees in Ryhope Dene and Hesleden Dene.

*82B. **R. pulvini** Kieffer (*salicina* Giraud, non Schrank; *klugi?* H. Loew *non* Meigen) 1891, p. 244 (*Cecidomyia*); 1913–2, p. 71.

On *Salix aurita* and *S. vitellina*. Houard, S. 19.

NORTHUMBERLAND, Ovingham.

83. **R. rosaria** † H. Loew (*salicina* Auct., *cinerearum* Hardy), 1850, p. 35; Kieffer, 1913–2, p. 71.

On *Salix* spp. Houard, S. 8.
Generally distributed; records from all counties.

*84. **R. rosariella** Kieffer, 1901–1, p. 494 (gall); 1913–2, p. 71.

On *Salix* spp. Houard, S. 9.
DURHAM, Waldridge, on *S. aurita* and *cinerea*; Gibside, on *S. repens*. LANCASHIRE, near Ainsdale, and Freshfield, on *S. repens*. Also recorded by Mr. Burkill from Surrey on *S. repens*.

85. **R. saliciperda** Dufour (*terebrans* H. Loew), 1841, p. 262 (*Cecidomyia*); Kieffer, 1913–2, p. 71.

On *Salix* spp. Houard, S. 36.
NORTHUMBERLAND, Newham. DURHAM, Billingham and Waldridge. CUMBERLAND, Alston. LANCASHIRE, near Ainsdale. YORKSHIRE, Eston.

86. **R. salicis** Schrank (*degeeri* Bremi, *gallarum salicis* Hardy), 1803, p. 69 (*Tipula*); Kieffer, 1913–2, p. 71.

On *Salix* spp. Houard, S. 40.
Records from all counties excepting Westmoreland and Cheshire.

*87. **R. superna** Kieffer, 1897, p. 24.

On *Salix*. Recorded by Houard, S. 26, from *S. Caprea*, *aurita* and *cinerea*; we have not succeeded in tracing the species in Kieffer, 1913–2.
DURHAM, on a hybrid *S. cinerea* × *viminalis*; Billingham. The larva is distinctive.

88. **R. terminalis** H. Loew, 1850, p. 35 (*Cecidomyia*); Kieffer, 1913–2, p. 72.

On *Salix* spp. Houard, S. 14, *Perrisia terminalis*.
Common; records from all counties.

[89. *R. viminalis*, Westwood, 1847, p. 588; Kieffer, 1913–2, p. 72.

† The *Dasyneura salicina* of Swanton's Catalogue must be regarded as a synonym, the gall being but the incipient stage of the "Rose-gall."

Perrisia Rondani, 1846, p. 371.

*90. **P. abietiperda** Henschel, 1880, p. 371 (*Cecidomyia*); Kieffer, 1913–2, p. 73.

Gall on *Picea excelsa*. Houard, 100.

NORTHUMBERLAND, near Hexham. DURHAM, Gibside and Eastgate. LANCASHIRE, Grange-over-Sands, rare. YORKSHIRE, Nunthorpe.

*91. **P. acercrispans** Kieffer, 1888–2, p. 266 (*Cecidomyia*); 1913–2, p. 73.

On sycamore. Houard, 3984.

DURHAM, dene near Fencehouses.

*92. *P. acercrispans* var. *rubella* Kieffer, 1896–2, p. 37.

On *Acer campestre*. Houard, 4025.

Recorded by Mr. Burkill from Monmouthshire.

93. **P. acrophila** Winnertz, 1853, p. 233 (*Cecidomyia*); Kieffer, 1913–2, p. 73.

On *Fraxinus*. Swanton, 681; Houard, 4643.

Local; records from all counties excepting Lancashire and Cheshire.

94. **P. affinis** Kieffer, 1886, p. 330 (*Cecidomyia*); 1913–2, p. 73.

On *Viola* spp. Swanton, 632, 634, 635 and 637; Houard, 4281, 4283, 4284 and 4290.

Local; records from all counties excepting Cheshire.

*95. **P. alni** F. Loew, 1877, p. 2 (*Cecidomyia*); Kieffer, 1913–2, p. 73.

On *Alnus*. Houard, 1127; known throughout Europe.

NORTHUMBERLAND, Ninebanks, once only.

96. *P. alpina* F. Loew, 1885, p. 110 (*Cecidomyia*); Kieffer, 1913–2, p. 73.

On *Silene acaulis*. Swanton, 344; Houard, 2274.

97. *P. anglica* Kieffer, 1909, p. 31 (gall and larva); 1913–2, p. 73.

On *Vaccinium Vitis-idaea*, = Cecidomyid sp. Swanton, 676, and Houard, 4571.

98. **P. aparines** Kieffer, 1889, p. 208 (*Cecidomyia*); 1913–2, p. 73.

On *Galium Aparine*. Swanton, 763; Houard, 5303.
NORTHUMBERLAND, Wylam, Belford. DURHAM, several localities. CHESHIRE, Bidston.

*99. **P. aucuparia** Kieffer.†

On *Pyrus Aucuparia*. Houard, 2907.
NORTHUMBERLAND, Ovingham. DURHAM, Gibside. Also from Scotland.

*100. **P. axillaris** Kieffer, 1896–1, p. 87; 1913–2, p. 74.

On *Trifolium* sp. On *T. medium* Houard, 3593.
LANCASHIRE and WESTMORELAND, once near Grange-over-Sands. DURHAM, coast near Horden; Birtley, on *T. fragiferum*.

*101. **P. ballotae** Rübsaamen.

On *Ballota nigra*, flowers remaining closed.
NORTHUMBERLAND, Denton Burn (H. S. Wallace and R. S. B.).

*102. **P. beckiana** Mik, 1885, p. 140 (*Cecidomyia*); Kieffer, 1913–2, p. 74.

On *Inula squarrosa* (= *I. Conyza*). Houard, 5623.
LANCASHIRE, Grange-over-Sands. J. W. H. H. has observed similar galls on *Pulicaria dysenterica* at Cowpen Bewley in Durham.

103. **P. brassicae** Winnertz, 1853, p. 213 (*Cecidomyia*); Kieffer, 1913–2, p. 74.

On *Brassica* spp. Swanton, 415, 420; Houard, 2591 (*Dasyneura brassicae*).
DURHAM, Hylton, on **Brassica oleracea* (Houard, 2573).

*104. **P. brunellae** Kieffer, 1909, p. 3 (gall and larva); 1913–2, p. 74.

On *Prunella vulgaris*, = Cecidomyid sp. Houard, 4818.
NORTHUMBERLAND, Ovington. YORKSHIRE, Stainton.

† We have been unable to trace this in Kieffer, 1913–2.

*105. **P. bryoniae** Bouché, 1847, p. 144 (*Cecidomyia*); Kieffer, 1913–2, p. 74.

On *Bryonia dioica.* Houard, 5476.
DURHAM, near Lamesley.

*106. **P. campanulae** Rübsaamen.

On *Campanula media* and *C. persicaefolia.*
DURHAM, Birtley. CUMBERLAND, Alston.

107. *P. capitigena* Bremi (*Euphorbiae* partim H. Loew), 1847, p. 50 (*Cecidomyia*); Kieffer, 1913–2, p. 74.

On *Euphorbia Esula.* Swanton, 597.

108. **P. cardamines** Winnertz, 1853, p. 225 (*Cecidomyia*); Kieffer, 1913–2, p. 74.

On *Cardamine* spp. Swanton, 390 and 393; Houard, 2672 and 2665.
DURHAM, in the Derwent Valley.

109. **P. cerastii** Binnie, 1877, p. 181 (*Cecidomyia*); Kieffer, 1913–2, p. 75.

On *Cerastium vulgatum.* Swanton, 348; Houard, 2338.
NORTHUMBERLAND, Warkworth, on **C. semidecandrum* and *C. vulgatum.* DURHAM, Ryhope Dene.

*110. **P. cirsii** Rübsaamen, 1890, p. 236 (*Cecidomyia*); Kieffer, 1913–2, p. 75.

In heads of *Cirsium arvense.* Houard, 5927.
Not uncommon; records from all counties.

*111. **Perrisia** sp. Bagnall and Harrison, 1916 (iii), p. 199.

In heads of *Cirsium arvense,* like *P. cirsii,* but larvae yellowish to orange instead of red (? form or stage of *P. cirsii*).
Not uncommon; records from all counties excepting Cheshire.

*112. **Perrisia** sp. Bagnall and Harrison, 1916 (iii), p. 199.

Heads of *Cirsium arvense* closed; a few petals to one side only breaking out; larva solitary, deep vermilion to crimson.
NORTHUMBERLAND, Ninebanks. DURHAM, Penshaw, Fatfield, and Gibside.

*113. **P. compositarum** Kieffer, 1888 2, p. 310 (*Cecidomyia*); 1913–2, p. 75.

Heads of *Cirsium lanceolatum*. Houard, 5911.

NORTHUMBERLAND and DURHAM, numerous records. LANCASHIRE, Lathom. YORKSHIRE, Marton; Bardsey near Leeds.

*114. **Perrisia** sp. Bagnall and Harrison, 1916 (iii), p. 199.

Heads of *Cirsium lanceolatum*, heads remaining closed or not opening fully; often bent or twisted; florets apparently normal; larvae white to yellowish.

Records from NORTHUMBERLAND, DURHAM, CUMBERLAND, YORKSHIRE and LANCASHIRE.

*115. **P. corylina** Kieffer for *coryli* Rübsaamen, 1912, p. 288; Kieffer, 1913–2, p. 75.

In catkins of *Corylus*.

LANCASHIRE, Grange-over-Sands, October. YORKSHIRE, Guisbrough, October.

116. **P. crataegi** Winnertz, 1853, p. 228 (*Cecidomyia*); Kieffer, 1913–2, p. 75.

On *Crataegus monogyna*. Swanton, 540; Houard, 2942.

Common everywhere; records from all counties.

*117. **P. daphnes** Kieffer, 1901–2, p. 18; 1913–2, p. 75.

On *Daphne Laureola*. Houard, 4312.

YORKSHIRE, Gunnergate.

*118. **P. engstfeldi** Rübsaamen, 1889, p. 375 (*Cecidomyia*); Kieffer, 1913–2, p. 75.

On *Spiraea Ulmaria* Houard, 2832 and 2837.

Local but widely distributed; records from all counties. Also from Scotland.

*119. **Perrisia** sp. Bagnall and Harrison, 1916 (iii), p. 200.

On *Spiraea Ulmaria*, on the underside of leaf, like *P. engstfeldi*, but always adjacent to midrib or nerve, which is considerably swollen in such manner as to become a shelter to the larva.

Extremely local, but plentiful where it occurs. DURHAM, Gibside and near Lamesley; Billingham. CUMBERLAND, Alston.

120. **P. epilobii** F. Loew, 1889, p. 201 (*Cecidomyia*); Kieffer, 1913–2, p. 76.

On *Epilobium angustifolium*. Swanton, 641, 642; Houard, 4345.

NORTHUMBERLAND, Seahouses, Spindlestone, Budle Bay, etc. DURHAM, Gibside.

*121. **P. ericina** F. Loew, 1885–2, p. 76 (*Cecidomyia*); Kieffer, 1913–2, p. 76.

On *Erica cinerea*.

DURHAM, Waldridge. YORKSHIRE, Great Ayton Moor.

121A. **P. filicina** Kieffer, 1889, p. 191 (*Cecidomyia*); 1913–2, p. 76.

On *Pteris aquilina*. Swanton, 3; Houard, 68.

Records from all counties excepting Cumberland.

*122. **P. floriperda** F. Loew, 1888, p. 231 (*Cecidomyia*); Kieffer, 1913–2, p. 76.

On *Silene inflata*. Houard, 2261.

DURHAM, Fatfield and Fencehouses.

*123. **P. flosculorum** Kieffer, 1890–3, p. 200 (*Cecidomyia*); 1913–2, p. 76.

Flower of *Trifolium pratense*. Houard, 3579.

DURHAM, Penshaw. LANCASHIRE and WESTMORELAND, near Grange-over-Sands.

124. **P. fraxinea** Kieffer, 1907–1, p. 523; 1913–2, p. 76.

On *Fraxinus*, = *Dasyneura fraxinea*, Swanton, 678; Houard, 4647.

Apparently widely distributed; records from all counties.

125. **P. fraxini** Kieffer, 1897–2, p. 301; 1913–2, p. 76.

On *Fraxinus*. Swanton, 679, 680; Houard, 4644.

Records from all counties excepting Cheshire.

*126. **P. fructuum** Rübsaamen, 1895, p. 258 (*Dichelomyia*); Kieffer, 1913–2, p. 76.

On *Cerastium vulgatum*. Houard, 2330.

NORTHUMBERLAND, Warkworth, Ovingham. DURHAM, Fatfield, Penshaw, Birtley, Greatham. CHESHIRE, Bidston.

Yorkshire, Marton, Cleveland district; Leeds district. Also taken (at Warkworth) on *Cerastium semidecandrum*, and in Cleveland on *C. viscosum*.

127. *P. galeobdolontis* Winnertz, 1853, p. 238 (*Cecidomyia*); Kieffer, 1913–2, p. 76.

On *Lamium Galeobdolon*. Swanton, 716; Houard, 4847.

128. **P. galii** H. Loew, 1850, p. 37 (*Cecidomyia*); Kieffer, 1913–2, p. 77.

On *Galium verum*. Swanton, 747, 748; Houard, 5284, 5292.

Northumberland, Seahouses, Bamburgh, Warkworth, Ovingham. Durham, Blackhall Rocks; Hylton; Penshaw Hill; near Cornforth. Lancashire, Birkdale, one only.

On *Galium uliginosum*. Houard, 5268.
Durham, Waldridge Fell.

*129. **Perrisia** sp. Schlechtendal, etc.

On *Galium verum*. Houard, 5289.
Durham, on one patch of bed-straw near Penshaw.

130. **P. galiicola** F. Loew, 1880, p. 33; Kieffer, 1913–2, p. 77.

On *Galium* spp. Swanton, 753; Houard, 5209, also *5286 and *5275.

Northumberland, Bamburgh, Warkworth. Durham, coast near Hartlepool, Penshaw Hill and Catcleugh; rock near Sunderland, on *G. verum*. Cumberland, Alston, on *G. verum*.

*131. **P. genistamtorquens** Kieffer, 1888–2, p. 311 (*Cecidomyia*); 1913–2, p. 77.

On *Genista tinctoria*. Houard, 3371.
Durham, Gibside, rare.

132. **P. genisticola** F. Loew, 1877, p. 4 (*Cecidomyia*); Kieffer, 1913–2, p. 77.

On *Genista tinctoria*. Swanton, 548, 549; Houard, 3368, 3369. It also occurs on *G. anglica* (Swanton, 547; Houard, 3349).

Northumberland, Ovingham. Durham, Gibside.

*133. **P. gentianae** Kieffer, 1909, p. 9 (gall); 1913–2, p. 77.

In flowers and seed-cases of *Gentiana campestris* and *G. Amarella*, = Cecidomyid sp. Houard, 4696.

NORTHUMBERLAND, between Alnmouth and Warkworth. DURHAM, Penshaw Hill and Blackhall Rocks. (This species is recorded in Houard (4696) from British Isles only, but in Kieffer (1913–2) it is recorded from Central Europe. Examples from seed-cases cause chloranthia as well as a swelling of the ovary, and are possibly referable to a second species.

*134. **P. geranii** Kieffer, 1907–2, p. 44; 1913–2, p. 77.

We have not cleared up the question of Cecidomyids affecting *Geraniaceae*. The records here refer to *P. geranii* on *Erodium cicutarium* only (Houard, 3826); but we append also our notes under the names of various species of *Geranium*.

NORTHUMBERLAND, Budle Bay, very common; Warkworth. DURHAM, Cowpen Bewley, one only. LANCASHIRE, Freshfield, two only. YORKSHIRE, Redcar.

Other notes :—

(1) *Geranium pratense.*

(*a*) Yellow larvae *in* seeds (*Dasyneura geranii*).

NORTHUMBERLAND, Budle Bay and Ninebanks. DURHAM, Birtley, Eastgate, Wolsingham and Horden. CUMBERLAND, Alston.

(*b*) Bright orange-red larvae *in* seeds *with* above.

NORTHUMBERLAND and DURHAM, all above records.

(2) *Geranium sylvaticum.*

(*a*) Yellow larvae *in* seeds (*Dasyneura geranii*).
(*b*) Bright orange-red larvae *in* seeds in company.

Records from NORTHUMBERLAND and DURHAM.

(3) *Geranium sanguineum.*

Yellow larva *in* seeds.

DURHAM, Horden and Blackhall Rocks. YORKSHIRE, in a moraine garden, Linthorpe.

(4) *Geranium dissectum.*

Yellow larva *in* seeds.
DURHAM, Fatfield.

(5) *Geranium molle.*

Yellow larva *in* seeds.
YORKSHIRE, Redcar.

(6) *Geranium pusillum.*

Yellow larva *in* seeds.

NORTHUMBERLAND, Warkworth.

(7) *Geranium pusillum.*

One or more transparent, lemon-yellow larvae amongst seeds and in the flower.
LANCASHIRE, Freshfield and Ainsdale, common.

(8) *Erodium cicutarium.*

Creamish-yellow larvae amongst seeds and in the flower.
YORKSHIRE, Redcar. NORTHUMBERLAND, Warkworth.

135. *P. glechomae* Kieffer, 1889–2, p. 263 (*Cecidomyia*); 1913–2, p. 77.

On *Glechoma hederacea.* Swanton, 707, 708; Houard, 4807, 4808.

*136. ? *P. glyciphylli* Rübsaamen, 1912, p. 286; Kieffer, 1913–2, p. 77.

On *Astragalus hypoglottis.*
Records from Scotland.

*137. **P. holosteae** Kieffer, 1909, p. 29 (gall and larva); 1913–2, p. 77.

On **Stellaria graminea.*
NORTHUMBERLAND, between Langley Woods and Whitfield.
On *Stellaria Holostea.*
NORTHUMBERLAND, Stocksfield (H. S. Wallace). DURHAM, Gibside, Winlaton Mill.

*138. **P. hygrophila** Mik, 1883, p. 209 (*Cecidomyia*); Kieffer, 1913–2, p. 77.

On *Galium palustre.* Houard, 5278.

NORTHUMBERLAND, Ninebanks. DURHAM, near Gibside, Low Fell and Waldridge. LANCASHIRE, not uncommon, Freshfield, Ainsdale and Lathom. YORKSHIRE, Nunthorpe; Bardsey near Leeds; also recorded by Mr. Burkill. Mr. Burkill also records this species from Derbyshire, Staffordshire and Surrey.

139. *Perrisia* sp. Trail, 1878.

On *Galium palustre.* Swanton, 758; Houard, 5277.

140. **P. hyperici** Bremi, 1847, p. 53 (*Cecidomyia*); Kieffer, 1913–2, p. 77.

On *Hypericum* spp. Swanton and Houard. Recent records from *H. perforatum*, *H. pulchrum*, *H. humifusum* and * *H. montanum.*

Records from all counties excepting Cheshire and Yorkshire.

*141. **Perrisia** sp. Burkill, 1916.

On *Hypericum elodes.* Terminal leaves thickened at the base, folded over and crinkled, turning brown at the tips. Larvae yellow, several in each gall.

YORKSHIRE, Mr. Burkill's record.

142. *P. ignorata* Wachtl (*medicaginis* Bremi, gall; *onobrychidis* F. Loew *non* Bremi), 1884, p. 163 (*Cecidomyia*); Kieffer, 1913–2, p. 77.

On *Medicago sativa.* Swanton, 561; Houard, 3515.

143. **P. inchbaldiana** Mik (? *clausilia* Bremi), 1886, p. 317 (*Cecidomyia*); Kieffer, 1913–2, p. 77.

On *Salix alba.* Houard, S. 52; Swanton, 98; Houard, 627.

Records from all counties.

144. **P. inclusa** Frauenfeld, 1862, p. 1175 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Phragmites communis.* Swanton, 50; Houard, 245.

DURHAM, Billingham.

*145. **P. kiefferi** Marchal, 1896, p. 99; Kieffer, 1913–2, p. 78.

On *Hedera Helix.* Houard, 4362.

NORTHUMBERLAND, Warkworth district. LANCASHIRE and WESTMORELAND, Grange-over-Sands district, common. DURHAM, Gibside and Low Fell. YORKSHIRE, Middlesbrough and Gunnergate; Leeds. Also from Scotland.

*146. **P. kiefferiana** Rübsaamen, 1891, p. 5 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Epilobium angustifolium.* Houard, 4348.

DURHAM, Gibside, rare. YORKSHIRE, see Burkill. Also recorded by Mr. Burkill from Surrey.

*147. † **P. lamii** Kieffer.

On *Lamium maculatum,* = Cecidomyid sp. Houard, 4836.

DURHAM, Birtley, in a garden.

*148. ‡ **P. laricis** F. Loew, 1878, p. 393 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Larix decidua.* Houard, 86.

DURHAM, Lanchester, Winlaton Mill; Gibside. LANCASHIRE, Grange-over-Sands. YORKSHIRE, Eston.

*149. **P. lathyri** Kieffer, 1909, p. 13 (gall and larvae); 1913–2, p. 78.

On *Lathyrus pratensis,* = *Perrisia* sp. Houard, 3775.

Records from all counties excepting Cheshire.

*150. **P. lathyricola** Rübsaamen, 1890, p. 26 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Lathyrus pratensis.* Houard, 3771.

Records from all counties.

151. **Perrisia** sp. (*lathyricola* Swanton).

On *Lathyrus pratensis.* Swanton, 595; Houard, 3776.

Records from all counties.

† We have been unable to trace this name in Kieffer, 1913–2.
‡ = *Kellneri* Henschel (gall).

*152. *Perrisia* sp. Burkill, 1917, p. 83.

On *Lathyrus pratensis.*

Recorded by Mr. Burkill from W. Gloucestershire.

*153. **P. libera** Kieffer, 1909, p. 21 (gall); 1913–2, p. 78.

On Oak, = Cecidomyid sp. Houard, 1310.

NORTHUMBERLAND, Warkworth; Ovingham. DURHAM, several records. LANCASHIRE, Grange-over-Sands. YORKSHIRE, Leeds district and near Middlesbro'.

*153A. **P. lithospermi** H. Loew, 1850, p. 36 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Lithospermum officinale.* Houard, 4741.

NORTHUMBERLAND, Ovingham; on an isolated patch of the host-plant.

154. **P. lotharingiae** Kieffer, 1888–1, p. 107 (*Cecidomyia*); 1913–2, p. 78.

On *Cerastium vulgatum.* Swanton, 346, 347; Houard, 2331, 2334.

Records from all counties excepting Cheshire.

*155. **P. loti** Kieffer, 1909, p. 14; 1913–2, p. 78.

On *Lotus corniculatus,* = Cecidomyid sp. Houard, 3622.

DURHAM, Gibside, apparently rare.

156. **P. loticola** Rübsaamen, 1889–2, p. 52 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Lotus major* and occasionally **L. corniculatus.* Swanton, 584; Houard, 3626, *3616.

Records from all counties excepting Westmoreland.

*157. **P. lupulinae** Kieffer, 1891, p. 258; 1913–2, p. 78.

On *Medicago lupulina.* Houard, 3507.

DURHAM, near Burnmoor.

*158. **Perrisia** sp. Kaltenbach and others.

On *Medicago lupulina.* Houard, 3509.

DURHAM, Hylton and Penshaw. Recorded by Mr. Burkill from W. Gloucestershire.

*159. **P. lychnidis** Heyden, 1861, p. 98 (*Cecidomyia*); Kieffer, 1913–2, p. 78.

On *Lychnis alba*. Houard, 2292.

NORTHUMBERLAND, coast near Bamburgh. DURHAM, Lamesley, Fencehouses. LANCASHIRE, Ainsdale.

160. **P. mali** Kieffer, 1904–2, p. 345; 1913–2, p. 78.

On *Pyrus Malus*. Swanton, 533; Houard, 2885.

DURHAM, near Stanley.

*161. **P. malpighii** Kieffer, 1909. p. 21 (gall); 1913–2, p. 78.

On *Quercus*. Houard, 1354.

NORTHUMBERLAND, Warkworth, rare. DURHAM, Gibside. LANCASHIRE, Grange-over-Sands. YORKSHIRE, Leeds; Bardsey.

*162. **P. miki** Kieffer, 1909, p. 6 (gall); 1913–2, p. 78.

On (*a*) *Centaurea nigra* and (*b*) *C. Scabiosa*, = Cecidomyid sp. Houard, 5981.

NORTHUMBERLAND, near Staward (*a*). DURHAM, Fatfield (*a*), Billingham (*b*), Hylton (*b*), and Gibside (*a*). CUMBERLAND, near Nenthead (*a*). LANCASHIRE and WESTMORELAND, near Grange-over-Sands (*a*). YORKSHIRE, Marton.

*163. **Perrisia** sp. Bagnall and Harrison, 1916 (iii), p. 199.

Head of (*a*) *Centaurea nigra* swollen, breaking round edges; larvae in large numbers, yellowish to pink. Also in (*b*) *C. Scabiosa*.

NORTHUMBERLAND and DURHAM, several records in (*a*) and (*b*). CHESHIRE, Bidston Hill, plentiful (*a*). CUMBERLAND, Nenthead (*a*).

*164. **Perrisia** sp. Bagnall and Harrison, 1917 (v), p. 14.

In old heads of *Centaurea Scabiosa*, larvae gregarious, orange-red to copper-red, small; *not* the above species.

NORTHUMBERLAND, Warkworth. DURHAM, Catcleugh Rock, near Sunderland; Ryhope; Fulwell; Easington. Also in old heads of *C. nigra*.

*165. **Perrisia** sp. Bagnall and Harrison, 1917 (v), p. 14.

In a garden *Helianthus*; gregarious larvae in heads, golden-yellow-orange to orange-red.

DURHAM, Fatfield.

166. **P. muricatae** Meade (*caricis* H. Loew), 1886, p. 153 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

In utricle of *Carex vulpina*, *C. contigua*, **C. pendula*, *C. laevigata*, *C. sylvatica* and *C. pallescens*. Swanton, 69, 70; Houard, 361, 362.

NORTHUMBERLAND, Warkworth, on *C. pendula*. DURHAM, Gibside, on *C. pendula*, *C. sylvatica* and *C. pallescens*; Waldridge, on *C. laevigata*; Billingham. LANCASHIRE, near Grange-over-Sands, on *C. vulpina*.

*167. **P. nervicola** Kieffer, 1909, p. 9 (gall); 1913–2, p. 79.

On *Hieracium Pilosella*, = Cecidomyid sp. Houard, 6205.

DURHAM, very local, Birtley Fell, Roker. YORKSHIRE, Huddersfield district (W. Falconer).

168. *P. onobrychidis* (*giraudi* Frauenf.) Bremi, 1847, p. 53 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

On *Astragalus danicus*. Swanton, 585; Houard, 3646. Probably *P. glyciphylli*.

*168A. **P. panteli** Kieffer, 1909, p. 21 (gall); 1913–2, p. 79.

On Oak. Houard (Cecidomyid), 1315.

NORTHUMBERLAND, Ovingham, 1 only (H. S. Wallace). YORKSHIRE, Leeds, plentiful on one old tree.

169. **P. papaveris** Winnertz, 1853, p. 229 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

In capsules of *Papaver Rhoeas*. Swanton, 377; Houard, 2479.

DURHAM, an isolated record, in field near Hylton.

*170. **P. periclymeni** Rübsaamen, 1889–2, p. 54 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

On *Lonicera Periclymenum*. Houard, 5361.

NORTHUMBERLAND, Warkworth; Ovingham. DURHAM, Gibside (Barry Stewart and R. S. B.), Waldridge; Urpeth; Winlaton; Fencehouses and Easington. CHESHIRE, Bidston Hill. YORKSHIRE, Bardsey, near Leeds.

171. **P. persicariae** Linné, 1767, p. 977 (*Tipula*); Kieffer, 1913–2, p. 79.

On *Polygonum amphibium*. Swanton, 324, 325; Houard, 2157, 2159.

DURHAM, Urpeth.

172. **P. plicatrix** H. Loew, 1850, p. 36 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

On *Rubus* spp. Swanton, 479, 482, 490; Houard, 2966, 2978, 3025.

In some districts very common; records from all counties.

*173. **P. polygalae** Kieffer, 1909, p. 18 (gall); 1913–2, p. 79.

In *Polygala vulgaris*, larvae in flower. See Houard, 3855.

DURHAM, Birtley, Horden, Lanchester district (H. S. Wallace and J. W. H. H.). CUMBERLAND, Alston.

*174. **P. populeti** Rübsaamen, 1889–2, p. 57 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

On *Populus tremula* and *P. tremulae* × *alba*. Houard, 503.

DURHAM, Gibside and near Winlaton Mill. NORTHUMBERLAND, on the Alnwick road four miles north of Morpeth.

175. *P. potentillae* Wachtl, 1885, p. 193 (*Cecidomyia*); Kieffer, 1913–2, p. 79.

On *Potentilla*.

*176. **P. praticola** Kieffer, 1892–1, p. 216 (*Cecidomyia*); 1913–2, p. 79.

In flower *Lychnis Flos-cuculi*. Houard, 2290.

DURHAM, Gibside, Billingham.

*177. **P. pteridicola** Kieffer, 1901–2, p. 19 (*Cecidomyia*); 1913–2, p. 80.

On *Pteris aquilina*, local. Houard, 69.

NORTHUMBERLAND, Ninebanks. DURHAM, Fatfield, Birtley.

*178. **P. pustulans** Rübsaamen, 1889–1, p. 378 (*Cecidomyia*); Kieffer, 1913–2, p. 80.

On *Spiraea Ulmaria*, local. Houard, 2838.

Records from all counties excepting Lancashire and Westmoreland. Mr. Burkill records it from Derbyshire.

179. **P. pyri** Bouché, 1847, p. 144 (*Cecidomyia*); Kieffer, 1913–2, p. 80.

On *Pyrus communis*. Swanton, 526; Houard, 2864.
Durham, Gibside. Lancashire, Lathom.

*180. † **P. pierreana** Kieffer.

On *Salix cinerea*, = *Perrisia* sp. Houard (S. 42), 892.
Durham, Waldridge. Lancashire, near Ainsdale.

181. **P. ranunculi** Bremi, 1847, p. 54 (*Cecidomyia*); Kieffer, 1913–2, p. 80.

On *Ranunculus* spp. Swanton, 362, 366, 370; Houard, 2423, 2431, 2438.
Records from all counties excepting Cheshire and Cumberland.

*182. **P. raphanistri** Kieffer, 1886, p. 324 (*Cecidomyia*); 1913–2, p. 80.

On *Brassica Napus*. Houard, 2594 (*Dasyneura raphanistri*).
Northumberland, Warkworth. Durham, rare and local, Fatfield, Fencehouses and Penshaw.

*183. **P. rhododendroni** Kieffer, 1909, p. 95; 1913–2, p. 80.

On *Rhododendron ferrugineum*. Houard.
Yorkshire, in a moraine garden at Linthorpe, near Middlesbrough.

184. **P. rosarum** Hardy, 1850, p. 186 (*Cecidomyia*); Kieffer, 1913–2, p. 80.

On *Rosa* spp. Swanton, 503, 507, 512; Houard, 3135, 3186.
Records from all counties excepting Westmoreland and Cheshire.

*185. **Perrisia** sp.

On *Rosa* spp. like *P. rosarum* gall, larvae white.
Northumberland and Durham, several records (= *Dirhiza rhodophila*).

† We have been unable to trace this in Kieffer, 1913–2.

*186. **P. rostrupiana** Kieffer, 1909, p. 29 (gall and larva); 1913–2, p. 80.

On *Spiraea Ulmaria*, = Cecidomyid sp. Houard, 2836.

Not common; records from all counties excepting Cheshire.

*187. ? **P. rubsaameni** Kieffer, 1909, p. 6 (gall); 1913–2, p. 80.

On *Carpinus Betulus*, parenchymatous, = Cecidomyid sp. Houard, 1041.

Circular clear-cut holes observed in leaves of hornbeam (counties Durham and Lancashire) in October are probably the results of this insect. Requires confirmation.

*188. **P. salicariae** Kieffer, 1888–1, p. 96 (*Cecidomyia*); 1913–2, p. 80.

On *Lythrum Salicaria*. Houard, 4325, 4326.

Northumberland, not uncommon near Bamburgh.

*189. **P. sanguisorbae** Kieffer, 1890–1, p. 26 (*Cecidomyia*); 1913–2, p. 80.

On *Sanguisorba officinalis*. Houard, 3100.

Durham, near Penshaw.

*190. **P. scabiosae** Kieffer, 1888–1, p. 97 (*Cecidomyia*); 1913–2, p. 81.

On *Scabiosa Columbaria*. Houard, 5466, 5470.

Durham, Penshaw Hill, common; and Catcleugh Rock, near Sunderland.

*191. **P. schlechtendali** Kieffer, 1886, p. 328 (*Cecidomyia*); 1913–2, p. 81.

On *Lathyrus macrorhizus*. Houard, 3781.

Durham, Birtley; Fatfield; Fencehouses; Gibside, common; Winlaton (H. S. Wallace), and near Lanchester. Northumberland, Ovingham.

*192. **P. schmidti** Rübsaamen, 1912, p. 284; Kieffer, 1913–2, p. 81.

Heads of *Plantago lanceolata*.

Durham, Greatham. Lancashire, Grange-over-Sands.

193. **P. serotina** Winnertz, 1853, p. 316 (*Cecidomyia*); Kieffer, 1913–2, p. 81.

On *Hypericum* spp. Swanton; Houard.

NORTHUMBERLAND, near Staward and Ovingham, on *H. pulchrum*; Warkworth, on *H. humifusum*. DURHAM, near Lanchester and Winlaton Mill, on *H. pulchrum*; Gibside, on *H. perforatum* and *H. pulchrum*; Dinsdale and Castle Eden, on *H. hirsutum*. LANCASHIRE, Hampsfell, Grange-over-Sands, on *H. pulchrum*, very local. YORKSHIRE, Bardsey, near Leeds.

*194. **P. silvicola** Kieffer, 1909, p. 30 (gall and larva); 1913–2, p. 81.

On **Stellaria graminea*.

NORTHUMBERLAND, between Langley Woods and Whitfield.

On *Stellaria Holostea* = *Perrisia* sp. Houard, 2311.

NORTHUMBERLAND, Warkworth; Ovingham. DURHAM, Gibside and Easington. YORKSHIRE, Bardsey, near Leeds.

*195. **P. similis** F. Loew, 1888, p. 232 (*Cecidomyia*); Kieffer, 1913–2, p. 81.

On *Veronica* spp.

NORTHUMBERLAND, Warkworth, on *V. officinalis* and *V. Chamaedrys*. DURHAM, Gibside, on *V. scutellata* and *V. officinalis*; Lanchester and Stanhope, on *V. officinalis*; Castle Eden and Birtley, on *V. Chamaedrys*.

196. **P. sisymbrii** Schranck, 1803, p. 83 (*Tipula*); Kieffer, 1913–2, p. 81.

On various Crucifers. Swanton; Houard.

DURHAM, Swalwell, on *Sisymbrium officinale*.

*197. ? **P. sodalis** F. Loew, 1877, p. 7 (*Cecidomyia*); Kieffer, 1913–2, p. 81.

On *Prunus*. *P. tortrix* and this species produce identical galls, and it will be necessary to breed out specimens before this can be definitely included in our list. See records under *P. tortrix*.

198. **P. stachydis** Bremi, 1847, p. 55 (*Cecidomyia*); Kieffer, 1913–2, p. 81.

On *Stachys sylvatica* and **palustris*. Swanton, 711–714; Houard, 4860–62.

Records from all counties excepting Westmoreland.

*199. *Perrisia* sp. Burkill, 1916.

On *Stachys palustris*; buds galled by white larvae.

Recorded by Mr. Burkill from Derbyshire.

*200. **P. strobi** Winnertz, 1853, p. 234 (*Cecidomyia*); Kieffer, 1913–2, p. 81.

In cones of *Picea excelsa*.

Northumberland, near Corbridge. Mr. Evans records this species from Perthshire ("Ent. M. Mag.," 1909, p. 17).

*201. **P. tetensi** Rübsaamen, 1892, p. 400 (*Cecidomyia*); Kieffer, 1913–2, p. 82.

On leaves of *Ribes* spp.

Durham, Gibside, on *R. Grossularia*; Birtley, on *R. nigra*.

*202. **P. tetrahit** Kieffer, 1909, p. 8 (gall and larva); 1913–2, p. 82.

In *Galeopsis Tetrahit* flowers, = *Perrisia* sp. Houard, 4831.

Lancashire, near Lathom.

*203. **P. thomasiana** Kieffer, 1888–1, p. 95 (*Cecidomyia*); 1913–2, p. 82.

On *Tilia vulgaris* and *platyphyllos*. Houard, 4124, 4155.

Northumberland, Ovingham, Warkworth. Durham, several records. Cumberland, Keswick and Alston. Lancashire, Grange-over-Sands. Yorkshire, Gunnergate. Also from Scotland.

*204. **Perrisia** sp. Bagnall and Harrison, 1917 (v), p. 14.

On *Tilia*, like *P. thomasiana*, but larva milk-white.

Northumberland, Plessey. Durham, near Chester-le-Street; Stanhope.

205. **P. tiliamvolvens** (*tiliae* Schr., gall), Rübsaamen, 1889–2, p. 55 (*Cecidomyia*); Kieffer, 1913–2, p. 82.

On *Tilia* sp. Swanton, 618; Houard, 4160.
DURHAM, Castle Eden Dene.

*206. **P. tortrix** F. Loew, 1877, p. 6 (*Cecidomyia*); Kieffer, 1913–2, p. 82.

On (*a*) *Prunus domestica*, wild, and (*b*) *P. spinosa*. Houard, 3269, 3274, 3282.

NORTHUMBERLAND, near Minsteracres, (*a*) H. 3269 and 3274.† YORKSHIRE, Bardsey near Leeds. LANCASHIRE, gall (*a*) H. 3274 only, near Lindale; Blackburn district (G. W. Nixon), perhaps referable to *P. sodalis* or both species. Mr. Burkill, 1916, records this species from *P. spinosa*, Devon.

207. **P. trachelii** Wachtl, 1885, p. 195 (*Cecidomyia*); Kieffer, 1913–2, p. 82.

On *Campanula rotundifolia*. Swanton, 796, 797; Houard, 5513.
DURHAM, near Wolsingham.

*208. **P. traili** Kieffer, 1909, p. 25 (gall); 1913–2, p. 82.

On *Ranunculus acris*, = Cecidomyid sp. Houard, 2420.
NORTHUMBERLAND, Ovingham. DURHAM, near Penshaw.

209. **P. trifolii** F. Loew, 1874, p. 143 (*Cecidomyia*); Kieffer, 1913–2, p. 82.

On *Trifolium* spp. Swanton, 568, 569, 572, 577; Houard, 3589–91–96–64.
Records from all counties excepting Westmoreland.

*210. **Perrisia** sp. Burkill, 1916.

On *Trifolium pratense*, leaflets folded into a pod resembling the gall caused by *P. trifolii*, but each gall is occupied by a white larva.
DURHAM, near Hylton. NORTHUMBERLAND, Warkworth. Recorded by Mr. Burkill from Derbyshire.

† *Perrisia sodalis* may also occur in the gall 3274, but the presence of 3269 enables one to definitely record *P. tortrix*.

*211. *Perrisia* sp. Burkill, 1916.

On *Trifolium repens,* leaves thickened and forming a firm fleshy gall, with aborted buds inside, among which live several larvae.

Recorded by Mr. Burkill from Surrey.

212. **P. tubicola** Kieffer, 1889–1, p. 188 (*Cecidomyia*); 1913–2, p. 82.

On *Cytisus scoparius.* Swanton, 559; Houard, 3423.

NORTHUMBERLAND and DURHAM, several records. CUMBERLAND, Keswick. LANCASHIRE, Freshfield.

*213. **P. ulicis** Kieffer, 1909, p. 31 (gall); 1913–2, p. 82.

On *Ulex,* = Cecidomyid sp. Houard, 3396.

NORTHUMBERLAND, between Alnmouth and Warkworth. DURHAM, Gibside, Waldridge (gall only). LANCASHIRE, Grange-over-Sands (signs). YORKSHIRE, Eston (old galls).

214. **P. ulmariae** Bremi, 1847, p. 52 (*Cecidomyia*); Kieffer, 1913–2, p. 82.

On *Spiraea Ulmaria.* Swanton, 475; Houard, 2839.

Common; records from all counties.

215. *Perrisia* sp.

On *Spiraea Filipendula. Perrisia ulmaria* of Swanton, 476 and Houard, 2830. Swanton (1912, p. 64) suggests the name *P. filipendulae* for this gall, but that name has already been used by Kieffer (1909, p. 29) for another species affecting the same plant.

*216. **P. ulmicola** Kieffer, 1909, p. 31 (gall and larva); 1913–2, p. 82.

On *Ulmus.*

DURHAM, Burnmoor, Gibside, Norton. NORTHUMBERLAND, Warkworth, rare. YORKSHIRE, Bardsey, near Leeds.

217. **P. urticae** Perris, 1840, p. 403 (*Cecidomyia*); 1913–2, p. 82.

On *Urtica dioica* and (more rarely) on *U. urens.* Swanton, 312, 316; Houard, 2095, 2099.

Very common everywhere.

*218. **P. vaccinivorum** Kieffer (nom. nov. for *vaccinii* Rübs. *non* Smith); Rübsaamen, 1895, p. 258 (*Dichelomyia*); Kieffer, 1913–2, p. 82.

On *Vaccinium Myrtillus.* Houard, 4564.
DURHAM, rare, Birtley, Waldridge.

219. **P. veronicae** (*chamaedrys* Inchb.) Vallot, 1827, p. 93 (*Cecidomyia*); Kieffer, 1913–2, p. 83.

On *Veronica Chamaedrys.* Swanton, 728; Houard, 5080. Recorded also in Houard from the British Isles on **V. officinale* (5085) and **V. serpyllifolia* (5105).

Very common; records from all counties. Taken by J. W. H. H. at Ninebanks in Northumberland on *V. montana,* and by R. S. B. at Warkworth on *V. officinale.*

220. **P. viciae** Kieffer, 1888–1, p. 105 (*Cecidomyia*); 1913–2, p. 83.

On *Vicia* spp. Swanton, 590, 594; Houard, 3731, 3696, *3723.

General; records from all counties excepting Westmoreland.

221. **P. violae** F. Loew, 1880, p. 34 (*Cecidomyia*); Kieffer, 1913–2, p. 83.

On *Viola arvensis.* Swanton, 640; Houard, 4293.
DURHAM, Gibside, rare. CUMBERLAND, near Nenthead, rare.

*222. **P. virgae-aureae** Liebel, 1889, p. 283 (*Cecidomyia*); Kieffer, 1913–2, p. 83.

On *Solidago Virgaurea.* Houard, 5560, 5564.
NORTHUMBERLAND, near Staward.

*223. **Perrisia** sp. Kieffer, 1898.

On *Solidago Virgaurea.* Houard, 5559.
Records from all counties excepting Cumberland.

*224. **P. vitis-idaeae** Kieffer, 1909, p. 31 (gall); 1913–2, p. 83.

On *Vaccinium Vitis-idaea.* Houard, 4570.
CUMBERLAND, summit of Skiddaw.

*225. **Perrisia** sp. Bagnall and Harrison, 1917 (v), p. 14.

On *Myosotis arvensis*; flower closed and slightly swollen, containing larva.

LANCASHIRE, Grange-over-Sands. Kieffer has described two species of *Perrisia* from the flower of *Myosotis palustris*.

Hartigiola Rübsaamen, 1912, p. 161.

226. **H. annulipes** Hartig (*piliger* H. Loew), 1844, p. 162 (*Cecidomyia*); Kieffer, 1913–2, p. 85.

Gall on beech-leaves. Swanton, 292; Houard, 1153. Records from all counties excepting Westmoreland.

Taxomyia Rübsaamen, 1912, p. 216.

227. **T. taxi** Inchbald, 1861, p. 76 (*Cecidomyia*); Kieffer, 1913–2, p. 86.

On *Taxus baccata*. Swanton, 14; Houard, 150.

NORTHUMBERLAND, Felton. DURHAM, Gibside, Fatfield, Birtley. LANCASHIRE, Grange-over-Sands, Silverdale. YORKSHIRE, Gunnergate.

Group ASPHONDYLARIAE.

Schizomyia Kieffer, 1889–1, p. 183.

228. **S. galiorum** Kieffer, 1889, p. 184; 1913–2, p. 89.

On *Galium* spp. Swanton, 746, 756; Houard, 5281, 5248.

Records from all counties excepting Westmoreland and Cheshire.

*228A. **S. ligustri** Rübsaamen 1899–1, p. 598; Kieffer, 1913–2, p. 89.

In flowers of privet. Houard, 4679.

DURHAM, Hemlington; Hesleden Dene. Also taken at Bath.

Kiefferia Mik, 1895, p. 96.

229. **K. pimpinellae** F. Loew (*umbellatarum* F. Loew), 1874, p. 157; Kieffer, 1913–2, p. 90.

On *Umbelliferae* spp. Swanton, 657, 666, 670; Houard, 4445, 4499, 4529.

DURHAM, abundant on a plant of **Angelica sylvestris*, Lamesley; once only on *Pimpinella saxifraga,* Penshaw. On *Daucus carota,* Hart (J. Gardner). This species is not recorded in Houard on *Angelica.*

Asphondylia H. Loew, 1850, p. 21.

230. *A. dorycnii* F. Loew, 1880, p. 37; Kieffer, 1913–2, p. 93.

On *Dorycnium.*

231. *A. genistae* H. Loew, 1850, p. 38; Kieffer, 1913–2, p. 93.

On *Genista* (*germanica,* Houard, 3345).

*232. **A. lupulinae** Kieffer, 1909, p. 14 (gall and nymph); 1913–2, p. 93.

On *Medicago lupulina,* = *Asphondylia* sp. Houard, 3506. NORTHUMBERLAND, Warkworth. DURHAM, Birtley; near Penshaw. CUMBERLAND, near Alston.

233. **A. mayeri** Liebel, 1889, p. 266; Kieffer, 1913, p. 93.

On *Cytisus scoparius.* Swanton, 558; Houard, 3412. NORTHUMBERLAND and DURHAM, many records. LANCASHIRE, Freshfield.

*234. ? **A. mikii** Wachtl, 1880, p. 535; Kieffer, 1913–2, p. 94.

"*Medicago lupulina. Perrisia* sp. Seeds swollen and enlarged, each containing a yellow midge larva."—Burkill, 1916, p. 5.

YORKSHIRE, Burkill's record.

*235. **A. melanopus** Kieffer, 1890–1, p. 31; 1913–2, p. 93.

Seed-pods of *Lotus corniculatus,* rare. Houard, 3613. NORTHUMBERLAND, Warkworth. DURHAM, Birtley, Tinkler Fell, Penshaw Hill. LANCASHIRE, near Freshfield.

*236. **A. ononidis** F. Loew, 1873, p. 139; 1913–2, p. 94.

On *Ononis repens.* Houard, 3501.

NORTHUMBERLAND, Warkworth. DURHAM, on the coast etween Horden and Hart.

*237. **A. proximा** Kieffer, 1909, p. 30 (larva and gall); 1913–2, p. 94.

On *Thymus Serpyllum*, = Cecidomyid sp. Houard, 4914. DURHAM, Stanhope. CUMBERLAND, Alston. LANCASHIRE and WESTMORELAND, Hampsfell and Meathop Fell, near Grange-over-Sands.

238. **A. sarothamni** H. Loew, 1850, p. 38; Kieffer, 1913–2, p. 94.

On *Cytisus scoparius*. Swanton, 556, 557; Houard, 3414, 3422.
Records from all counties excepting Westmoreland.

239. **A. thymi** Kieffer, 1898–2, p. 59; 1913–2, p. 94.

On *Thymus Serpyllum*. Swanton, 699; Houard, 4913.
NORTHUMBERLAND, Warkworth.

240. **A. ulicis** Verrall, 1875, p. 225 (gall); Kieffer, 1913–2, p. 94.

On *Ulex europaeus*. Swanton, 552; Houard, 3395, 3397.
Common; records from all counties.

Group BRACHYNEURARIAE.

Phaenolauthia Kieffer, 1912–2, p. 2.

*241. **P. cardui** Kieffer, 1904–2, p. 346; 1913–2, p. 111.

In galls of *Trypeta cardui*.
DURHAM, Penshaw and Edmondsley.

Mikiola Kieffer, 1896–3, p. 5.

242. **M. fagi** (*Tipula rubra* Hermann) Hartig, 1839, p. 4; Kieffer, 1913–2, p. 105.

Gall on leaves of *Fagus*. Swanton, 291; Houard, 1151. NORTHUMBERLAND and DURHAM, several records. CUMBERLAND, Alston. YORKSHIRE, Marton.

Lasiopteryx Stephens,† 1829, p. 240.

243. *L. obfuscata* Meigen, 1818, p. 90; Kieffer, 1913–2, p. 117.

† Doubtful genus.

Brachyneura Rondani, 1840; p. 18 (type *fusco-grisea* Rondani).

244. *B. stygia* Walker (*nec* Meigen).†

Group Cecidomyiariae (Diplosariae).

Hormomyia H. Loew, 1850, pp. 20 and 31.

245. *H. fischeri* Frauenfeld, 1867, p. 781; Kieffer, 1913–2, p. 138.

On *Carex limosa*. Swanton, 72.

*246. **H. frireni** Kieffer, 1909, p. 5; 1913–2, p. 138.

Durham, Gibside, on *Carex binervis*; Birtley Fell, on *C. flava*.

247. *H. grandis*, Meigen, 1804, p. 39 (*Cecidomyia*); Kieffer, 1913–2, p. 138.

*248. **H. kneuckeri** Kieffer, 1909, p. 5; 1913–2, p. 138.

On *Carex stellulata*. = *Hormomyia* sp. Houard, 368.
Durham, Waldridge.

Dishormomyia Kieffer, 1912–2, p. 2.

*249. **D. cornifex** Kieffer, 1898–2, p. 60 (*Hormomyia*); 1913–2, p. 139.

On *Carex stricta* and *C. flava*. Houard, 373.
Durham, near Chester-le-Street. Cheshire, Bidston Hill.

Trishormomyia Kieffer, 1912–2, p. 2.

*250. **T. tuberifica** Rübsaamen, 1899, p. 603 (*Hormomyia*); Kieffer, 1913–2, p. 140.

On *Carex* spp. Houard, 376.
Cheshire, Bidston Hill, not rare. ? Durham, Gibside, on *C. binervis*, and coast between Horden and Hart, on *C. glauca*. Northumberland, Warkworth, on *C. glauca*.

† See Collin, 1904, note (3).

Cyrtodiplosis Kieffer, 1912–2, p. 1.

*251. **C. crassinerva** Kieffer, 1901–2, p. 172 (*Clinodiplosis*); 1913–2, p. 144.

On *Stachys sylvatica*. Houard, 4859.
DURHAM, Birtley, Lamesley, Lambton and Fatfield.

Monarthropalpus Rübsaamen, 1892, p. 381.

252. **M. buxi** Geoffrey, 1764, p. 545 (*Scatopse*); Kieffer, 1913–2, p. 150.

YORKSHIRE, Nunthorpe.

Dichrona Rübsaamen, 1899, p. 542.

*253. **D. gallarum** Rübsaamen, 1899, p. 542; Kieffer, 1913–2, p. 151.

On *Carex* spp.
NORTHUMBERLAND, Bamburgh, on *C. distans*. DURHAM, Waldridge, on *C. flava*. CHESHIRE, Bidston Hill, several, on *C. stricta*.

Arthrocnodax Rübsaamen, 1895–2, p. 189.

254. *A. fraxinella* Meade, 1888, p. 77 (*Diplosis*); Kieffer, 1913–2, p. 156.

In galls of the Eriophyid, *E. fraxini*, on Ash.

Phaenobremia Kieffer, 1912–2, p. 1.

*255. **Phaenobremia** sp. Bagnall and Harrison, 1917–2, p. 208.

DURHAM, West Cornforth, larvae feeding on *Aphis mali* on apple.

Aphidoletes Kieffer, 1904–2, p. 385.

*256. **A. abietis** Kieffer, 1896–2, p. 382 (*Bremia*); 1913–2, p. 164.

DURHAM, in galls of *Adelges abietis*, Gibside.

*257. **Aphidoletes** sp. Bagnall and Harrison, 1917–3, p. 229.

DURHAM, in galls of *Adelges strobilobius*, Gibside; larva entirely red.

Anabremia Kieffer, 1912–2, p. 1.

*258. **A. bellevoyei** Kieffer, 1896–2, p. 384; 1913–2, p. 169.

On *Lathyrus pratensis. Clinodiplosis bellevoyei*, Houard, 3774.

Records from all counties.

*259. **A. viciae** Kieffer (nom. nov.) (*Clinodiplosis longiventris* larva, but not imago), 1909, p. 32; 1913–2, p. 169.

In flowers of *Vicia sepium. C. longiventris*, Houard, 3694.

DURHAM, Fatfield, taken by Mr. W. Hall.

Hadrobremia Kieffer, 1912–2, p. 1.

*260. **H. longiventris** Kieffer (imago, not larva; *trifolii* Kieffer larva, l.c. p. 31), 1909, p. 34 (*Clinodiplosis*); 1913–2, p. 170.

On *Trifolium pratense. C. trifolii* Kieffer, Houard (supplement), 6922.

DURHAM, Birtley.

Endaphis Kieffer, 1896–2, p. 383.

*261. **E. perfidus** Kieffer, 1896–2, p. 383; 1913–2, p. 172.

Endoparasite of *Aphis platanoides*.

NORTHUMBERLAND, Warkworth.

*262. **Endaphis** sp. Bagnall and Harrison, 1917–2, p. 208.

Endoparasite of an *Aphis* on *Ononis*.

DURHAM, Penshaw Hill.

Thurauia Rübsaamen, 1899–2, p. 38.

*263. **Thurauia** sp. Bagnall and Harrison, 1917–2, p. 208.

DURHAM, Waldridge Fell, in leaf-sheaths of *Carex Goodenovii*, submerged.

Syndiplosis Rübsaamen, 1910, p. 425.

*264. **S. lonicerearum** F. Loew, 1877, p. 17 (*Diplosis*); Kieffer, 1913–2, p. 178.

On *Viburnum Opulus. Cont. lonicerearum*, Houard, 5338.

NORTHUMBERLAND, Ovingham. DURHAM, Fatfield, Gibside, Waldridge Fell.

265. *S. petioli* Kieffer, 1898–2, p. 37 (*Harmandia*); 1913–2, p. 178.

On *Populus tremula*. *H. petioli*, Swanton, 173, 174; Houard, 493, 497.

Contarinia Rondani, 1860, p. 287.

*266. **C. acetosae** Kieffer, 1901–2, p. 31; 1913–2, p. 179.

In flowers of *Rumex Acetosa* and *Acetosella*. Houard, 2128, 2136.

NORTHUMBERLAND, Warkworth. DURHAM, Greenside and near Lanchester; Beamish. CHESHIRE, Bidston Hill.

*267. **C. anthobia** F. Loew, 1877, p. 16; Kieffer, 1913–2, p. 179.

In flowers of *Crataegus Oxyacantha*. Houard, 2941.

NORTHUMBERLAND and DURHAM, several records. YORKSHIRE, Gunnergate.

*268. **C. barbichei** Kieffer, 1890–1, p. 29; 1913–2, p. 179.

(*a*) On *Lotus corniculatus*. Houard, 3617.

Not rare; records from all counties.

(*b*) On *Lotus major*. Houard, 3627.

DURHAM, Gibside and Tinkler Fell.

*269. **C. betulicola** Kieffer, 1889–1, pp. 155 and 171; 1913–2, p. 179.

On *Betula alba*. Houard, 1069.

NORTHUMBERLAND and DURHAM, several records. LANCASHIRE, Freshfield, Grange-over-Sands. CHESHIRE, Bidston Hill. YORKSHIRE, Eston.

270. **C. betulina** Kieffer, 1889–1, p. 153; 1913–2, p. 179.

On *Betula alba*. Swanton, 192; Houard, 1076.

NORTHUMBERLAND and DURHAM, several records. LANCASHIRE, sandhills near Freshfield, plentiful. YORKSHIRE, Eston; Leeds.

271. **C. campanulae** Kieffer, 1895–3, p. 9; 1913–2, p. 180.

On *Campanula rotundifolia*. Swanton, 795; Houard, 5511.

NORTHUMBERLAND, Warkworth.

*272. **C. coryli** Kieffer, 1909, p. 31; 1913–2, p. 180.

On *Corylus Avellana*. = *Diplosine* sp., Houard, 1062. NORTHUMBERLAND and DURHAM, several records. LANCASHIRE, Grange-over-Sands, rather rare. WESTMORELAND, Kirkby-Stephen. YORKSHIRE, Bardsey, near Leeds.

273. **C. craccae** Kieffer, 1897–3, p. 15; 1913–2, p. 180.

On *Vicia* spp. Swanton, 589, 593; Houard, 3721, 3693. Not uncommon; records from all counties excepting Westmoreland.

*274. **C. cucubali** Kieffer, 1909, p. 28; 1913–2, p. 28.

On *Silene inflata*. = *Contarinia* sp., Houard, 2266. DURHAM, Birtley, Fatfield and Hylton.

*275. **C. gei** Kieffer, 1909, p. 9; 1913–2, p. 180.

On *Geum rivale*. = *Diplosine* sp., Houard, 3091. CUMBERLAND, near Nenthead.

276. **C. helianthemi** Hardy, 1850, p. 187; Kieffer, 1913–2, p. 180.

On *Helianthemum vulgare*. Swanton, 631; Houard, 4269.

NORTHUMBERLAND, Cheviot district (Hardy). DURHAM, Ryhope, Easington, Horden and Blackhall Rocks. LANCASHIRE and WESTMORELAND, Silverdale, Lindale, and Grange-over-Sands neighbourhood.

277. **C. heraclei** Rübsaamen, 1889–1, p. 274; Kieffer, 1913–2, p. 180.

On *Heracleum Sphondylium*. Swanton, 668; Houard, 4513.

NORTHUMBERLAND, Langley Woods. DURHAM, Birtley, not common; Hylton and near Washington, rare. CUMBERLAND, Nenthead.

*278. **C. lathyri** Kieffer, 1909, p. 13; 1913–2, p. 181.

In flower of *Lathyrus pratensis*. = *Contarinia* sp., Houard, 3770.

DURHAM, Penshaw, a few; Lamesley, one only.

279. **C. linariae** Winnertz, 1853, p. 260; Kieffer, 1913–2, p. 181.

On *Linaria vulgaris.* Swanton, 724; Houard, 5028.

DURHAM, Biddick and Fatfield (R. S. B. and W. Hall), Birtley. LANCASHIRE, near Freshfield.

280. **C. loti** De Geer, 1776, p. 420; Kieffer, 1913–2, p. 181.

(*a*) On *Lotus corniculatus.* Swanton, 583; Houard, 3614.

NORTHUMBERLAND, Ninebanks. DURHAM, several records. CUMBERLAND, Alston. LANCASHIRE, Birkdale, Ainsdale, Freshfield, in numbers.

*(*b*) On *Lotus major.* Houard, 3625.

LANCASHIRE, Ainsdale, rare. YORKSHIRE, see Burkill, 1916. Mr. Burkill also records this from Surrey and Staffordshire on *L. major.*

*281. ? *C. medicaginis* Kieffer, 1895–4, p. 150; 1913–2, p. 181.

On *Medicago falcata.* Swanton, 562.

The species recorded by Connold and Swanton (562), "Flowers and seed-pod swollen, reddish. Larvae gregarious," would seem to refer to this species and (in the seed-pod) *Asphondylia mikii.* Certainly not to *C. loti.*

282. **C. melanocera** Kieffer, 1909, p. 76; 1913–2, p. 181.

On *Genista tinctoria.* Swanton, 550; Houard, 3372.

DURHAM, Gibside, plentiful.

*283. *C. nasturtii* Kieffer, 1888–2, p. 263; 1913–2, p. 181.

See Carpenter, 1911, pp. 68–71, on *Brassica Rapa.* Houard, 6701 (supplement).

*284. **C. nicolayi** Rübsaamen, 1895–1, p. 183; Kieffer, 1913–2, p. 181.

On *Heracleum Sphondylium.* Houard, 4509.

DURHAM, many records. CUMBERLAND, Alston. LANCASHIRE, Grange and Lindale. YORKSHIRE, Redcar.

*285. **C. ononidis** Kieffer, 1889–3, p. 93; 1913–2, p. 181.

On *Ononis repens.* Houard, 3500.

NORTHUMBERLAND, Warkworth. DURHAM, between Horden and Hart; also Ryhope.

286. **C. pyrivora** Riley, 1886, p. 283 (*Diplosis*); Kieffer, 1913–2, p. 181.

On *Pyrus communis.* Swanton, 525; Houard, 2855.

DURHAM, Wear and Derwent valleys, a few old records.

287. **C. quercina** Rübsaamen (*dryophila* Kieffer), 1890, p. 21; Kieffer, 1913–2, p. 181.

On *Quercus.* Swanton, 278; Houard, 1207.

DURHAM, Gibside, Fatfield and West Cornforth. YORKSHIRE, Bardsey, near Leeds.

*288. **C. rubicola** (Kieffer, 1908, gall and larva) Rübsaamen, 1910, p. 424; Kieffer, 1913–2, p. 181.

In flowers of *Rubus caesius.* Houard (supplement), 6775.

NORTHUMBERLAND, Warkworth. DURHAM, Birtley, Biddick. LANCASHIRE and WESTMORELAND, near Grange-over-Sands.

289. **C. ruderalis** Kieffer, 1890–3, p. 198; 1913–2, p. 181.

On *Sisymbrium officinale.* Swanton, 403; Houard, 2576.

DURHAM, Birtley. YORKSHIRE, Redcar.

*290. **C. scabiosae** Kieffer, 1898–2, p. 60; 1913–2, p. 182.

On *Scabiosa Columbaria.* Houard, 5463.

DURHAM, near Birtley; Penshaw Hill; Tunstal Hill, near Sunderland; Horden and Hart. CUMBERLAND, near Alston.

*291. **C. scoparii** Rübsaamen, 1889–2, p. 48; Kieffer, 1913–2, p. 182.

On *Cytisus scoparius.* Houard, 3421 and 3430.

DURHAM, Horsleyhope and between Newbiggin and Rowley; Wolsingham.

*292. **C. sorbi** Kieffer, 1896–1, p. 99; 1913–2, p. 182.

On *Pyrus Aucuparia.* Houard, 2909.

DURHAM, Westgate. CUMBERLAND, near Alston. CHESHIRE, Bidston. YORKSHIRE, Great Ayton Moor.

293. **C. steini** Karsch, 1881, p. 227; Kieffer, 1913–2, p. 182.

On *Lychnis alba* and **L. dioica.* Swanton, 345; Houard, 2291 and *2294.

Records from all counties excepting Westmoreland.

294. **C. tiliarum** Kieffer, 1890–2, p. 193; 1913–2, p. 182.

On *Tilia platyphyllos* and *T. vulgaris*. Swanton, 615–17, 619; Houard, 4122–23–25–54.

Records from all counties excepting Westmoreland and Cheshire.

*295. **C. tragopogonis** Kieffer, 1909, p. 30; 1913–2, p. 182.

On *Tragopogon pratensis*. = *Contarinia* sp., Houard, 6077.

DURHAM, Wear Valley, from Chester-le-Street to Hylton; Ryhope. LANCASHIRE, Birkdale. CHESHIRE, Bidston. YORKSHIRE, Redcar.

296. **C. traili** Kieffer, 1889–2, p. 262; 1913–2, p. 182.

Flowers of *Pimpinella Saxifraga*. Swanton, 658; Houard, 4446.

DURHAM, near Penshaw, galls only, rare.

297. *C. tremulae* Kieffer, 1909, p. 78; 1913–2, p. 182.

On *Populus tremula*. = *Contarinia* sp., Swanton, 172; Houard, 502.

298. *C. tritici*, Kirby, 1797, p. 246 (*Cecidomyia*); Kieffer, 1913–2, p. 182.

*299. **C. valerianae** Rübsaamen, 1890, p. 231; Kieffer, 1913–2, p. 182.

Valeriana sambucifolia. Houard, 5421.

DURHAM, Gibside.

*300. **C. viburnorum** Kieffer (nom. nov. for *C. viburni* Kieff. *non* Felt), 1912–1, p. 230; 1913–2, p. 182.

In flowers of *Viburnum Opulus*.

NORTHUMBERLAND, Ovingham. DURHAM, many records. CUMBERLAND, Keswick.

*301. **Contarinia** sp. Rübsaamen; Lagerheim.

On *Galium verum*. Houard, 5288.

DURHAM, Penshaw Hill. NORTHUMBERLAND, Bamburgh, Warkworth. Also from Scotland.

*302. **Contarinia** sp. Bagnall and Harrison, 1917–3, p. 229.

On *Bupleurum tenuissimum*.

DURHAM, Greatham.

Stictodiplosis Kieffer, 1894, p. 28.

303. **S. corylina** F. Loew, 1878, p. 366; Kieffer, 1913–2, p. 183.

On *Corylus Avellana*. Swanton, 215; Houard, 1052.

LANCASHIRE, Grange-over-Sands, not uncommon. DURHAM, wood near Fatfield. NORTHUMBERLAND, Warkworth and Ovingham. YORKSHIRE, Bardsey, near Leeds.

*304. **S. hypochoeridis** Rübsaamen, 1891, p. 52; Kieffer, 1913–2, p. 183.

(*a*) On *Hypochoeris radicata*. Houard, 6034.
Records from all counties.

(*b*) On *Crepis biennis*. Houard (supplement), 7538.
YORKSHIRE, Stainton.

305. **S. jacobaeae** H. Loew, 1850, p. 29; Kieffer, 1913–2, p. 183.

On *Senecio Jacobaea* and **S. erucifolius*. Swanton, 841; Houard, 5865.

Records from all counties excepting Cumberland, but only once on *S. erucifolius* (Cowpen-Bewley, co. Durham).

*306. **S. pilosellae** Kieffer, 1896–1, p. 100; 1913–2, p. 183.

On *Hieracium Pilosella*. Houard, 6197.

DURHAM, Fatfield, and Tunstal Hill, near Sunderland, rare.

307. **S. scrophulariae** Kieffer, 1896–1, p. 100; 1913–2, p. 183.

On *Scrophularia nodosa*. Swanton, 726; Houard, 5063.

NORTHUMBERLAND, near Staward. DURHAM, Gibside, locally plentiful; Fencehouses. LANCASHIRE, Grange-over-Sands, rare.

*308. **S. umbellatarum** Rübsaamen, 1910, p. 422; Kieffer, 1913–2, p. 183.

Flowers of *Pimpinella magna*.
LANCASHIRE, near Grange-over-Sands.

Thecodiplosis Kieffer, 1895–2, p. 194.

309. **T. brachyntera** Schwägrichen, 1835, p. 162 (*Cecidomyia*); Kieffer, 1913–2, p. 184.

On *Pinus sylvestris*. Swanton, 21; Houard, 76.

NORTHUMBERLAND, near Warkworth. DURHAM, Tinkler Fell. LANCASHIRE, Grange-over-Sands.

Myricomyia Kieffer, 1900, p. 470.

*310. **M. mediterranea** F. Loew, 1885–2, p. 485 (*Diplosis*); Kieffer, 1913–2, p. 186.

On *Erica Tetralix.*

NORTHUMBERLAND, Blanchland. DURHAM, Waldridge, Birtley, Killhope and Waskerley. CUMBERLAND, Killhope. YORKSHIRE, Eston and Ayton.

Zeuxidiplosis Kieffer, 1904–2, p. 349.

*311. **Z. giardi** Kieffer, 1896–2, p. 383 (*Thecodiplosis giardiana* Kieffer, 1898); 1913–2, p. 187.

On (*a*) *Hypericum perforatum* and (*b*) *H. pulchrum*. = *Z. giardiana*, Houard, 4210, 4202.

NORTHUMBERLAND, near Staward (*b*), rare. DURHAM, Gibside (*a*), rare. CUMBERLAND, near Nenthead (*b*), rare.

Atrichosema Kieffer, 1904–2, p. 347.

312. *A. aceris* Kieffer, 1904–2, p. 348; 1913–2, p. 189.

On *Acer campestris.* Swanton, 606, 607; Houard, 4030.

Trichodiplosis Kieffer, 1912–1, p. 229.

*313. **T. caricis** Kieffer, 1898–2, p. 61 (*Antichira*); 1913–2, p. 191.

In leaf-sheaths of *Carex Goodenovii* and *C. glauca.*

DURHAM, Waldridge. NORTHUMBERLAND, Warkworth. CUMBERLAND, Alston. CHESHIRE, Bidston.

Antichiridium Rübsaamen, 1911, p. 168 (for *Antichira* Rübs. 1911, *non* Eschscholz).

*314. **A. striatum** Rübsaamen, 1911, p. 122 (*Antichira*); Kieffer, 1913–2, p. 192.

In leaf-sheaths of grasses and sedges if large and coarse.

NORTHUMBERLAND, Warkworth, on *Carex pendula.* DURHAM, Birtley, on *Typha latifolia*; Gibside, on *Carex pendula*; and near Swalwell, on *Phragmites.* LANCASHIRE, near Grange-over-Sands, on *Phragmites.*

Lestodiplosis Kieffer, 1894, p. 28.

315. *L. callida* Winnertz, 1853, p. 255 (*Diplosis*); Kieffer, 1913–2, p. 197.

316. *L. centralis* Winnertz, 1853, p. 277 (*Diplosis*); Kieffer, 1913–2, p. 197.

Pseudhormomyia Kieffer, 1898–2, p. 57.

317. **P. granifex** Kieffer, 1898–2, p. 57–8; 1913–2, p. 204.

On *Carex caespitosa*, **C. paniculata*, **C. stricta* and *C. flava*. Swanton, 71; Houard, *374.

CHESHIRE, Bidston Hill, on *C. stricta*. DURHAM, Birtley, on *C. flava*.

Taphodiplosis Kieffer, 1912–2, p. 2.

*318. **T. subterranea** Kieffer *et* Trotter, 1905, p. 65 (*Pseudhormomyia*); Kieffer, 1913–2, p. 205.

On *Carex* spp. Houard, 366.

NORTHUMBERLAND, Bamburgh, on *C. distans*. DURHAM, near Lanchester, on *C. divulsa*; Waldridge, on *C. flava*; Gibside, on *C. binervis*. LANCASHIRE, Grange-over-Sands.

Dyodiplosis Rübsaamen, 1912, p. 49.

*319. **D. arenariae** Rübsaamen, 1899, p. 602 (*Hormomyia*).

On *Carex arenaria*.

NORTHUMBERLAND, Bamburgh, rare.

Loewiola Kieffer, 1896–3, p. 5.

320. **L. centaureae** F. Loew, 1875, p. 25 (*Diplosis*); Kieffer, 1913–2, p. 207.

(*a*) On *Centaurea nigra*, very local. Swanton, 855, 856. DURHAM, Fatfield and Ryhope. LANCASHIRE, Lathom.

*(*b*) On *C. Scabiosa*. Houard, 5990.

DURHAM, Ryhope.

Recorded by Mr. Burkill from Surrey, on *C. Scabiosa*.

Putoniella Kieffer, 1896, p. 4.

321. **P. marsupialis** F. Loew, 1889, p. 536; Kieffer, 1913–2, p. 209.

On *Prunus spinosa*. Swanton, 456; Houard, 3295.

DURHAM, Ryhope Dene, plentiful.

Haplodiplosis Rübsaamen, 1911, p. 393.

*322. **H. equestris** B. Wagner, 1871, p. 41; Kieffer, 1913–2, p. 210.

See Houard, 333.

Lancashire, Grange-over-Sands, on a common grass—*Triticum* sp. or ally. Brought forward as British by the late F. Enock.

Cecidomyia *Meigen, 1803, p. 261.†

323. *C. pini* de Geer,‡ 1776, p. 417 (*Tipula*); Kieffer, 1913–2, p. 215.

324. *C. flava* Meigen, 1818, p. 99 (*Diplosis* Theobald); Kieffer, 1913–2, p. 215.

325. *C. verna* Curtis, 1827, p. 178; Kieffer, 1913–2, p. 220.

Macrodiplosis Kieffer, 1895–2, p. 194.

326. **M. dryobia** F. Loew, 1877, p. 14; Kieffer, 1913–2, p. 223.

On *Quercus*. Swanton, 279; Houard, 1306.

Northumberland and Durham, several records. Cumberland, Keswick. Lancashire, Grange. Yorkshire, Bardsey near Leeds and Nunthorpe.

327. **M. volvens** Kieffer, 1904–1, p. 79; 1913–2, p. 223.

On *Quercus*. Swanton, 280; Houard, 1307.

Northumberland and Durham, several records. Cumberland, Keswick. Lancashire, Grange-over-Sands, rare.

Xenodiplosis Felt, 1911, p. 61 (= *Allodiplosis* Rübs. *non* Kieffer).

*328. **X. laeviusculi** Rübsaamen, 1911, p. 85; Kieffer, 1913–2, p. 228.

On gall of *Neuroterus laeviusculus*.

Durham, Fatfield. Northumberland, Warkworth. Yorkshire, Bardsey near Leeds.

† All species in this genus excepting the type *pini* are insufficiently described, and therefore cannot be relegated to any known genus.

‡ Synonyms are *laterella* Zett., *pilosa* Bremi, and *pini-maritimae* Dup.

Parallelodiplosis Rübsaamen, 1910, p. 287.

*329. **P. galliperda** F. Loew, 1889, p. 202 (*Diplosis*); Kieffer, 1913–2, p. 229.

On gall of *Neuroterus lenticularis* on Oak.
NORTHUMBERLAND, Warkworth and Ovingham. YORKSHIRE, Nunthorpe.

Harmandia Kieffer, 1896–3, p. 5.

330. **H. tremulae** Winnertz, 1853, p. 263; Kieffer, 1913–2, p. 234.

On *Populus tremula.* Swanton, 175; Houard, 506.
DURHAM, Low Fell.

*331. **H. pustulans** Kieffer, 1909, p. 18 (gall), and 1912–1, p. 230 (larva); 1913–2, p. 234.

On *Populus tremula.* = *Diplosine* sp., Houard, 513.
YORKSHIRE, Nunthorpe, very rare.

Dichodiplosis Rübsaamen, 1911, p. 171.

*332. **D. langeni** Rübsaamen, 1911, p. 171; Kieffer, 1913–2, p. 235.

On dried plums.
DURHAM, Gibside.

Clinodiplosis Kieffer, 1894–2, p. 121.

*333. **C. betonicae** Kieffer, 1909, p. 3; Kieffer, 1913–2, p. 237.

In flower of *Betonica officinalis.*
NORTHUMBERLAND, Ninebanks; Warkworth. DURHAM, Gibside.

334. **C. botularia** Winnertz, 1853, p. 266 (*Diplosis*); Kieffer, 1913–2, p. 237.

Inquiline in galls of *Perrisia fraxini.*
NORTHUMBERLAND, near Staward. DURHAM, Penshaw Hill. CUMBERLAND, Alston. YORKSHIRE, Bardsey near Leeds and Gunnergate.

*335. **C. rosiperda** Rübsaamen, 1892–2, p. 54; Kieffer, 1913–2, p. 238.

On *Rosa villosa* (abroad on *Rosa centifolia* only, see Houard, R2, 3128).

DURHAM, Billingham, Lamesley and Gibside. NORTHUMBERLAND, Ovingham. YORKSHIRE, Bardsey near Leeds.

*336. **C. schlechtendali** Rübsaamen, 1911, p. 16; Kieffer, 1913–2, p. 238.

On *Convolvulus sepium.*
NORTHUMBERLAND, Warkworth. DURHAM, between Wolviston and Greatham.

Mycodiplosis Rübsaamen, 1895–1, p. 186.

336A. *M. coniophaga* Winnertz, 1853, p. 267; Kieffer, 1913–2, p. 242.

*337. **Mycodiplosis** sp. Bagnall and Harrison, 1917–2, p. 208.

On the aecidia of *Uromyces junci,* larva orange-red.
DURHAM, Billingham.

*338. **Mycodiplosis** sp. Bagnall and Harrison, 1917–2, p. 208.

On *Crepis paludosa,* larvae orange-pink, feeding on *Puccinia major.*
DURHAM, Waldridge Fell.

*339. **Mycodiplosis** sp. Bagnall and Harrison, 1917 (v), p. 14.

On *Cirsium arvense,* larvae crimson, feeding on *Puccinia suavolens.*
DURHAM, Fatfield, Fulwell near Sunderland, Penshaw. NORTHUMBERLAND, Warkworth.

*340. **Mycodiplosis** sp. Bagnall and Harrison, 1917–3, p. 229.

Larvae yellowish-orange on *Puccinia hieracii* on *H. boreale.*
DURHAM, Winlaton Mill.

Massalongia Kieffer, 1897–3, p. 12.

341. **M. rubra** Kieffer, 1890–3, p. 199; 1913–2, p. 246.

On *Betula alba.* Swanton, 193; Houard, 1075.
NORTHUMBERLAND, four miles north of Morpeth;

Ninebanks. DURHAM, Gibside, Waldridge, Tinkler Fell, Urpeth, Castle Eden dene. CHESHIRE, Bidston Hill, local. YORKSHIRE, Eston Moor; Leeds.

Ametrodiplosis Rübsaamen, 1911, p. 278.

342. *A. thalictricola* Rübsaamen, 1895–1, p. 257; Kieffer, 1913–2, p. 246.

On *Thalictrum minus* and *flavum*. *Clinodiplosis thalictricola*, Swanton, 356, 358; Houard, 2441, 2448; and on * *T. flexuosum*, Houard, 2451.

Monodiplosis Rübsaamen, 1910, p. 289.

*343. **M. liebeli** Kieffer (*Schizomyia sociabilis* Rübs.), 1889 (–1), p. 174; 1913–2, p. 248.

Living in galls of *Macrolabis dryobia* and *volvens*. NORTHUMBERLAND, Ovingham, with *M. volvens*. DURHAM, Gibside, Fatfield, with *M. dryobia*.

Atylodiplosis Rübsaamen, 1910, p. 338.

*344. **A. rumicis** H. Loew, 1850, p. 190; Kieffer, 1913–2, p. 257.

In flowers of *Rumex Acetosella*. Houard, 2128. General and sometimes common; records from all counties excepting Westmoreland.

Group PORRICONDYLARIAE.

Dirhiza H. Loew, 1850, p. 21.

345. **D. rhodophila** Hardy, 1850, p. 186 (*Cecidomyia*); Kieffer, 1913–2, p. 269.

NORTHUMBERLAND and DURHAM, several records. See No. 185.

Porricondyla Rondani, 1840, p. 14.

346. *P. longipes* H. Loew, 1850, p. 38 (*Epidosis*); Kieffer, 1913–2, p. 272.

Winnertzia Rondani, 1860, p. 287.

347. [*W. tenella* Walker, 1856, p. 129 (*Asynapta*); Kieffer, 1913–2, p. 283.

Subfamily *LESTREMINAE.*

Group CAMPYLOMYZARIAE.

Campylomyza Meigen,† 1818, p. 102 (also 1830).

348. [*C. aceris* Meigen, 1818, p. 102; Kieffer, 1913–2, p. 296.

349. [*C. bicolor* Meigen, 1818, p. 102; Kieffer, 1913–2, p. 296.

350. [*C. flavipes* Meigen, 1818, p. 102; Kieffer, 1913–2, p. 297.

351. *C. globifera* Haliday in Walker, 1856, p. 62; Kieffer, 1913–2, p. 297.

352. [*C. halterata* Zetterstedt, 1852, p. 4351; Kieffer, 1913–2, p. 297.

Amblyspatha Kieffer, 1913–2, p. 299.

*353. *A. ormerodi* Kieffer, 1913–1*a*, p. 52; 1913–2, p. 300. Only known from Scotland.

Group LESTREMIARIAE.

Catocha Haliday, 1833, p. 156.

354. [*C. brevinervis* Zetterstedt, 1851, p. 3770 (*Lestremia*); Kieffer, 1913–2, p. 307.

355. *C. latipes* Haliday, 1833, p. 156; Kieffer, 1913–2, p. 307.

Lestremia Macquart, 1826, p. 173.

356. *L. carnea* H. Loew, 1844, p. 324 (*Cecidomyia*); Kieffer, 1913–2, p. 308.

357. [*L. cinerea* Macquart, 1826, p. 173; Kieffer, 1913–2, p. 308.

† Due to insufficiency of description, many of the species in Kieffer's list are *doubtfully* included in the genus, doubtless including some, if not all, of the above.

358. *L. fusca* Meigen, 1830, p. 309; Kieffer, 1913–2, p. 308.

359. *L. leucophaea* Meigen (*juniperina* Fabr. *non* Linn.), 1818, p. 288 (*Sciara*); Kieffer, 1913–2, p. 308.

Subfamily *HETEROPEZINAE.*

Genus MIASTOR Meinert, 1864, p. 42; Kieffer, 1913–2, p. 313.

*359.A **Miastor** sp. Bagnall and Harrison, 1918, p. 61.
DURHAM, Birtley, increasing paedogenetically.

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The following eleven *Cecidomyid* spp. are recorded in Swanton's British Catalogue.

360. *Cecidomyid* sp. Swanton, 1901.
On *Ophioglossum vulgatum.* Swanton, 9.

361. *Cecidomyid* sp. Fitch, 1883.
On *Juniperus communis.* Swanton, 12; Houard, 134.

362. *Cecidomyid* sp. Zimmermann, 1907.
On *Castanea sativa.* Swanton, 289; Houard, 1167.

363. **Cecidomyid** sp. Trail, 1878.
On *Anthyllus Vulneraria.* Swanton, 582; Houard, 3604.
DURHAM, Birtley.

364. *Cecidomyid* sp. Trail, 1878; Kieffer, 1901.
On *Vicia sylvatica.* Swanton, 591; Houard, 3730.

365. **Cecidomyid** sp. Binnie, 1877, and others.
On *Angelica sylvestris.* Swanton, 664; Houard, 4475.
DURHAM, Vigo; Billingham, in countless thousands; Lamesley. YORKSHIRE, Great Ayton.

366. *Cecidomyid* sp. Liebel, Kieffer and others.
On *Veronica serpyllifolia.* Swanton, 727; Houard, 5107.

367. *Cecidomyid* sp. Trail, 1878; Kieffer, 1901.
On *Galium boreale.* Swanton, 744; Houard, 5196.

368. *Cecidomyid* sp. Trail, 1878; Kieffer, 1897; 1901.
On *Galium Aparine.* Swanton, 764; Houard, 5304.

369. **Diplosis** sp. Trail, 1878; Kieffer, 1901.
On *Valeriana sambucifolia.* Swanton, 783; Houard, 5422.
Durham, Waldridge.

370. **Cecidomyid** sp. Trail, 1878; Kieffer, 1901.
On *Senecio Jacobaea* and *S. aquatica.* Swanton, 842, 845; Houard, 5864, 5858.
Northumberland and Durham, several records.

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The following three species are shown in Houard as from the British Isles, but not in Swanton.

*371. *Cecidomyid* sp. Trail, 1873; Kieffer, 1901.
On *Rhinanthus Crista-galli.* Houard, 5129.

*372. **Cecidomyid** sp. Kieffer, 1901.
On *Thalictrum dunense.* Houard, 2456.
Northumberland, Warkworth.

*373. *Cecidomyid* sp. Kieffer, 1901.
On *Rosa spinosissima.* Houard, 3237.

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The following species are new or recent records.

*374. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.
On *Geum urbanum*, flowers remaining closed.
Durham, Norton and Fencehouses.

*375. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.
On *Betula alba.*
Durham, Waldridge and Gibside.

*376. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.
Seeds of *Trollius europaeus.*
Durham, Billingham.

*377. *Cecidomyid* sp. Burkill, 1916, p. 7.

Salix aurita and *S. aurita cinerea*, ♀ catkins.
Recorded by Mr. Burkill from Derbyshire.

*378. ? **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.

Pod of *Cytisus scoparius*; causer doubtfully Cecidomyid.
Records from Northumberland and Durham.

*379. **Cecidomyid** sp. Bagnall and Harrison, 1917 (v), p. 15.

Acorns of *Quercus Robur* and *cerris*.
Records from Durham, Yorkshire and Lancashire.

*380. **Cecidomyid** sp.† Bagnall and Harrison, 1916 (iii), p. 203.

In seeds of *Geranium pratense* and *G. sylvaticum* with *Das. geranii*, larvae bright orange-red to red.
Records from Northumberland and Durham.

*381. **Cecidomyid** sp. (? *P. geranii*). Bagnall and Harrison, 1916 (iv), p. 252.

In seeds of *Geranium dissectum*; larva yellow.
Durham, Fatfield.

*382. **Cecidomyid** sp. (? *P. geranii*) Bagnall and Harrison, 1916 (iv), p. 252.

In seeds of *Geranium molle*; larva yellow.
Yorkshire, Redcar.

*383. **Cecidomyid** sp. (? *P. geranii*). Bagnall and Harrison, 1917–3, p. 230.

In seeds of *Geranium pusillum*.
Northumberland, Warkworth.

*384. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.

In flowers and amongst seeds of *Geranium pusillum*; larva almost transparent lemon-yellow.
Lancashire, Freshfield and Ainsdale, common.

† See also under *Perrisia geranii* in regard to these Geranium records.

*385. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iv), p. 252.

Erodium cicutarium, in flowers and amongst seeds; larvae creamy-yellow.

YORKSHIRE, Redcar.

*386. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iv), p. 252; 1917–2, p. 207.

On *Pimpinella Saxifraga*.

DURHAM, Penshaw Hill.

*387. **Cecidomyid** sp. (*Perrisia* sp.). Bagnall and Harrison, 1916 (iii), p. 200.

On *Vaccinium Myrtillus*. Houard, 4566.

CUMBERLAND, Skiddaw. DURHAM, Gibside.

*388. **Cecidomyid** sp. (? *Janetiella*). Bagnall and Harrison, 1916 (iv), p. 252.

On *Euphrasia officinalis*.

Records from all counties; local.

*389. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iv), p. 252.

On *Atriplex patula*.

Records from YORKSHIRE and DURHAM.

*390. *Cecidomyid* sp. Burkill, 1916, p. 7.

On *Stachys palustris*.

Recorded by Mr. Burkill from Derbyshire.

*391. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

On *Stachys lanata*.

DURHAM, in a garden at Penshaw.

*392. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.

On *Campanula rotundifolia*.

Records from DURHAM and CUMBERLAND.

*393. *Cecidomyid* sp. Burkill, 1916, p. 8.

On *Achillea Millefolium*.

Recorded by Mr. Burkill from Sussex.

*394. **Cecidomyid** sp. Bagnall and Harrison, 1917–2, p. 230.

On *Achillea Millefolium.*

DURHAM, Hart.

*395. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.

On *Taraxacum officinale.*

NORTHUMBERLAND, Ninebanks.

*396. **Cecidomyid** sp. Bagnall and Harrison, 1916 (iii), p. 203.

In *Hieracium boreale* seeds.

DURHAM, Birtley Fell.

*397. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

Larvae feeding on mildew on Oak, yellowish.

NORTHUMBERLAND, Warkworth. DURHAM, Gibside.

*398. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

Larvae feeding on mildew on rose; yellowish.

DURHAM, Gibside. Known to the late Dr. Hardy (Hardy, 1850).

*399. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

Yellow larvae in galls of *Andricus fecundator.*

NORTHUMBERLAND, Warkworth. DURHAM, Winlaton Mill.

*400. **Cecidomyid** sp. Bagnall and Harrison, 1917–2, p. 230.

Larva milk-white, in leaf-sheaths of a small *Carex.*

DURHAM, Waldridge Fell.

*401. **Cecidomyid** sp. Bagnall and Harrison, 1917–2, p. 230.

Larva white, red at each end; in leaf-sheaths of a small *Carex.*

DURHAM, Waldridge Fell.

*402. **Cecidomyid** sp. Bagnall and Harrison, 1907–3, p. 230.

Larvae bright rose-red, under leaf-sheath of *Carex flava.*

DURHAM, Birtley Fell.

*403. **Cecidomyid** sp. Cotte, 1912.

Thornlike gall on *Galium verum*. Houard (supplement), 7372.

DURHAM, Penshaw and Seaton Carew, rare. Records from Scotland (Forth area), where it is plentiful.

*404. **Cecidomyid** sp. Bagnall and Harrison, 1917–2, p. 209.

On *Thalictrum dunense*. See Houard, 2443.

NORTHUMBERLAND, Warkworth. DURHAM, coast near Hart. Also from Scotland.

*405. *Cecidomyid* sp. Bagnall and Harrison, 1917–2, p. 209 (*a*).

*406. *Cecidomyid* sp. Bagnall and Harrison, 1917–2, p. 210 (*b*).

On *Astragalus hypoglottis*.

Records from Scotland.

*407. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 210.

Larva yellow, in spikelets of *Phleum pratense*.

DURHAM, Penshaw.

*408. **Cecidomyid** sp. Bagnall and Harrison, 1917–2, p. 210.

Minute yellow larva in the spikelet of *Poa* sp.

NORTHUMBERLAND, Ninebanks.

*409. **Cecidomyid** sp. Bagnall and Harrison, 1917–2, p. 210.

Larvae in spikelets of *Dactylus glomerata*.

DURHAM, Penshaw and Edmondsley.

*410. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 229.

On privet, flowers remaining closed, leathery, containing a solitary orange-yellow larva. *Not Schizomyia ligustri* of Rübsaamen.

NORTHUMBERLAND, Warkworth.

*411. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

On dead fungus-attacked seed-cases of *Lapsana*.

DURHAM, Gibside.

*412. **Cecidomyid** sp. Tavares, 1907.

On Oak. Houard, 1306A.

NORTHUMBERLAND, Warkworth. DURHAM, Fatfield. LANCASHIRE, Grange-over-Sands.

*413. **Cecidomyid** sp. (? *Contarinia*). Bagnall and Harrison, 1917–3, p. 229.

On *Angelica sylvestris*.

DURHAM, Billingham.

*414. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 229.

Minute rose-red larvae on dead seed-cases of *Scrophularia nodosa*.

NORTHUMBERLAND, between Warkworth and Alnmouth. DURHAM, Gibside.

*415. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 229.

Yellow-orange larvae feeding and pupating under the epiderm of stems of *Heracleum Sphondylium* growing in marshy place.

DURHAM, Gibside.

*416. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 229.

Pale reddish larva feeding externally on what look like parenchymatous galls on *Lonicera*.

NORTHUMBERLAND, Warkworth.

*417. **Cecidomyid** sp. (? = *Lasioptera* sp.). Bagnall and Harrison, 1917–3, p. 228.

A rather large bright salmon-coloured larva feeding in spikelets of *Carex vesicaria*.

DURHAM, Billingham.

*418. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

On *Helianthemum Chamoecistus*, flower remaining closed, larva solitary, pinkish-yellow. Houard, 4267.

DURHAM, coast between Horden and Hart.

*419. **Cecidomyid** sp. Bagnall and Harrison, 1917–3, p. 230.

Larvae semi-transparent, whitish, sometimes with yellowish tinge, feeding gregariously in the inner leaf-sheaths of *Carex glauca*.

Northumberland, near Warkworth. Durham, coast between Horden and Hart.

*420. **Cecidomyid** sp. Bagnall and Harrison, 1918, p. 61.

On *Achillea Ptarmica.*

Yorkshire, Bardsey near Leeds.

*421. **Cecidomyid** sp. Houard, 5450.

On *Knautia arvensis*, leaf pustules.

Northumberland, Ovington. Durham, Ryhope.

*422. **Cecidomyid** sp. Houard, S. 60.

On *Salix.*

Northumberland, Ovingham on *S. aurita.* Durham, Easington on *S. Caprea.*

*423. **Cecidomyid** sp. Bagnall and Harrison, 1918, p. 61.

In rotting turnips.

Durham, Birtley.

II. Check List of Named Species.

CECIDOMYIDAE.

Subfamily *CECIDOMYINAE.*

Group Lasiopterariae.

Genus **Clinorrhyncha** H. Loew.

1. *C. chrysanthemi* H. Loew.
2. *C. millefolii* Wachtl.
3. *C. leucanthemi* Kieffer.

Genus **Trotteria** Kieffer, = *Choristoneura* (praeocc.) Rübs.

1. *T. galii* Rübsaamen.
2. *T. sarothamni* (Kieffer).
3. *T. umbelliferarum* Kieffer.

Genus **Baldratia** Kieffer.

1. *B. salicorniae* Kieffer.

Genus **Stefaniella** Kieffer.

1. *S. brevipalpis* Kieffer.

Genus **Lasioptera** (Meigen).

1. *L. albipennis* Meigen.
2. *L. arundinis* Schiner.
3. *L. calamagrostidis* Rübsaamen.
4. *L. carophila* F. Loew.
5. *L. rubi* Heeger.

Group Oligotrophariae.

[Genus **Neocerata** Coquillet = *Perrisia.*

1. *N. rhodophaga* Coquillett.

Genus **Rhopalomyia** Rübsaamen.

1. *R. millefolii* (H. Loew).
   = *achilleae* Inchbald.
2. *R. tanaceticola* (Karsch).

Genus **Misopatha** Kieffer.

1. *M. florum* (Kieffer).
2. *M. foliorum* (H. Loew),
   = *abrotani* Trail.
3. *M. ptarmicae* (Vallot),
   = *florica* Winnertz.
4. *M. syngenesiae* (H. Loew).

Genus **Arceuthomyia** Kieffer.

1. *A. valerii* (Tavares).

Genus **Oligotrophus** Latreille.*

1. *O. juniperinus* (Linné).
2. *O. panteli* Kieffer.
3. *O. alopecuri* Reuter.
4. *O. bursarius* (Bremi).
5. *O. fagineus* Kieffer.
6. *O. hartigi* (Liebel).
7. *O. reaumurianus* (F. Loew).
8. *O. tympanifex* Kieffer.
9. *O. ulmi* Kieffer.
10. *O. loewianus* Kieffer.

Genus **Phyctidobia** Kieffer.

1. *P. solmsi* (Kieffer).

Genus **Mikomyia** Kieffer.

1. *M. coryli* (Kieffer).

Genus **Semudobia** Kieffer.

1. *S. betulae* (Winnertz).

Genus **Iteomyia** Kieffer.

1. *I. capreae* (Winnertz).
2. *I. major* (Kieffer).

Genus **Janetiella** Kieffer.

1. *J. lemeei* (Kieffer).
2. *J. thymi* (Kieffer).
3. *J. thymicola* (Kieffer).
4. *J. tuberculi* Rübsaamen.

Genus **Zygobia** Kieffer.

1. *Z. carpini* (F. Loew).

Genus **Craneiobia** Kieffer.

1. *C. corni* (Giraud).

Genus **Phegobia** Kieffer.

1. *P. tornatella* (Bremi).

Genus **Mayetiola** Kieffer.

1. *M. avenae* (Marchal).
2. *M. dactylidis* Kieffer.
3. *M. destructor* (Say).
4. *M. holci* Kieffer.
5. *M. joannisi* Kieffer.
6. *M. ventricola* Rübsaamen.
7. *M. hordei* Kieffer.†

Genus **Chortomyia** Kieffer.

1. *C. hellwigi* (Rübsaamen).
2. *C. moliniae* (Rübsaamen).
3. *C. poae* (Bosc.).
4. *C. radicifica* (Rübsaamen).

Genus **Cystiphora** Kieffer.

1. *C. hieracii* (F. Loew).
2. *C. taraxaci* Kieffer.
3. *C. leontodontis* Kieffer.
4. *C. pilosellae* Kieffer.
5. *C. sonchi* (F. Loew).

Genus **Macrolabis** Kieffer.

1. *M. corrugans* (F. Loew).
2. *M. hieracii* Kieffer.
3. *M. hippocrepidis* Kieffer.
4. *M. marteli* Kieffer.
5. *M. pilosellae* (Binnie).
6. *M. stellariae* (Liebel).

Genus **Arnoldia** Kieffer.

1. *A. quercicola* Kieffer.
2. *A. quercus* (Binnie).

Genus **Geocrypta** Kieffer.

1. *G. braueri* (Handlirsch).

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* The first two species truly belong to this genus as now limited, but all the other species are placed here temporarily.

† The generic position of this species is not yet certain.

Genus **Rhabdophaga** Westwood.

1. *R. albipennis* (H. Loew).
2. *R. clavifex* (Kieffer).
3. *R. dubiosa* Kieffer,
 = *dubia* Kieffer,
 = *griseicollis* Zett. *non* Meigen.
4. *R. giraudiana* Kieffer,
 = *saliciperda* Giraud *non* Dufour.
5. *R. heterobia* (H. Loew),
 = *saligna* Hardy.
6. *R. iteobia* (Kieffer).
7. *R. karschi* (Kieffer).
8. *R. marginemtorquens* (Winnertz).
9. *R. nervorum* (Kieffer),
 = *noduli* Rübsaamen.
10. *R. pierrei* (Kieffer).
11. *R. pseudococcus* Rübsaamen.
12. *R. pulvini* Kieffer,
 = *salicina* Giraud *non* Schrank,
 = ? *klugi* H. Loew *non* Meigen.
13. *R. rosaria* H. Loew,
 = *salicina* Auct,
 = *cinerearum* Hardy.
14. *R. rosariella* Kieffer.
15. *R. saliciperda* (Dufour),
 = *terebrans* H. Loew.
16. *R. salicis* (Schrank),
 = *degeeri* Bremi.
17. *R. superna* Kieffer.
18. *R. terminalis* (H. Loew).

Genus **Perrisia** Rondani.

1. *P. abietiperda* (Henschel).
2. *P. acercrispans* (Kieffer) and var. *rubella* (Kieffer.)
3. *P. acrophila* (Winnertz).
4. *P. affinis* (Kieffer).
5. *P. alni* (F. Loew).
6. *P. alpina* (F. Loew).
7. *P. anglica* Kieffer.
8. *P. aparines* (Kieffer).
9. *P. aucupariae* Kieffer.
10. *P. axillaris* Kieffer.
11. *P. ballotae* (Rübsaamen).
12. *P. beckiana* (Mik).
13. *P. brassicae* (Winnertz).
14. *P. brunellae* Kieffer.
15. *P. bryoniae* (Bouché).
16. *P. campanulae* (Rübsaamen).
17. *P. capitigena* (Bremi).
18. *P. cardamines* (Winnertz).
19. *P. cerastii* (Binnie).
20. *P. cirsii* (Rübsaamen).
21. *P. compositarum* (Kieffer).
22. *P. corylina* Kieffer,
 = *coryli* Rübsaamen.
23. *P. crataegi* (Winnertz).
24. *P. daphnes* Kieffer.
25. *P. engstfeldi* (Rübsaamen).
26. *P. epilobii* (F. Loew).
27. *P. ericina* (F. Loew).
28. *P. filicina* (Kieffer).
29. *P. floriperda* (F. Loew).
30. *P. flosculorum* (Kieffer).
31. *P. fraxinea* Kieffer.
32. *P. fraxini* Kieffer.
33. *P. fructuum* (Rübsaamen).
34. *P. galeobdolontis* (Winnertz).
35. *P. galii* (H. Loew).
36. *P. galiicola* F. Loew.
37. *P. genistamtorquens* (Kieffer)
38. *P. genisticola* (F. Loew).
39. *P. gentianae* Kieffer.
40. *P. geranii* Kieffer.
41. *P. glechomae* (Kieffer).
42. ? *P. glyciphylli* Rübsaamen.
43. *P. holosteae* Kieffer.
44. *P. hygrophila* (Mik).
45. *P. hyperici* (Bremi).
46. *P. ignorata* (Wachtl),
 = *medicaginis* Bremi,
 = *onobrychidis* F. Loew *non* Bremi.
47. *P. inchbaldiana* (Mik),
 = ? *clausilia* Bremi.
48. *P. inclusa* (Frauenfeld).
49. *P. kiefferi* Marchal.
50. *P. kiefferiana* (Rübsaamen).
51. *P. lamii* Kieffer.
52. *P. laricis* F. Loew,
 = *kellneri* Henschel.
53. *P. lathyri* Kieffer.
54. *P. lathyricola* (Rübsaamen).
55. *P. libera* Kieffer.
56. *P. lotharingiae* (Kieffer).
57. *P. loti* Kieffer.
58. *P. loticola* (Rübsaamen).
59. *P. lupulinae* Kieffer.
60. *P. lychnidis* (Heyden).
61. *P. mali* Kieffer.
62. *P. malpighii* Kieffer.
63. *P. mikii* Kieffer.

64. *P. muricatae* (Meade),
 = *caricis* H. Loew.
65. *P. nervicola* Kieffer.
66. ? *P. onobrychidis* Bremi,
 = *giraudi* Frauenfeld.
67. *P. papaveris* (Winnertz).
68. *P. periclymeni* (Rübsaamen).
69. *P. persicariae* (Linné).
70. *P. plicatrix* (H. Loew).
71. *P. polygalae* Kieffer.
72. *P. populeti* (Rübsaamen).
73. *P. potentillae* (Wachtl).
74. *P. praticola* (Kieffer).
75. *P. pteridicola* (Kieffer).
76. *P. pustulans* (Rübsaamen).
77. *P. pyri* (Bouché).
78. *P. pierreana* Kieffer.
79. *P. ranunculi* (Bremi).
80. *P. raphanistri* (Kieffer).
81. *P. rhododendroni* Kieffer.
82. *P. rosarum* (Hardy).
83. *P. rostrupiana* Kieffer.
84. *P. rübsaameni* Kieffer.
85. *P. salicariae* (Kieffer).
86. *P. sanguisorbae* (Kieffer).
87. *P. scabiosae* (Kieffer).
88. *P. schlechtendali* (Kieffer).
89. *P. schmidti* Rübsaamen.
90. *P. serotina* (Winnertz).
91. *P. silvicola* Kieffer.
92. *P. similis* (F. Loew).
93. *P. sisymbrii* (Schranck).
94. ? *P. sodalis* (F. Loew).
95. *P. stachydis* (Bremi).
96. *P. strobi* (Winnertz).
97. *P. tetensi* (Rübsaamen).
98. *P. tetrahit* Kieffer.
99. *P. thomasiana* (Kieffer).
100. *P. tiliamvolvens* (Rübsaamen),
 = *tiliae* Schranck.
101. *P. tortrix* (F. Loew).
102. *P. trachelii* (Wachtl).
103. *P. traili* Kieffer.
104. *P. trifolii* (F. Loew).
105. *P. tubicola* (Kieffer).
106. *P. ulicis* Kieffer.
107. *P. ulmariae* (Bremi).
108. *P. ulmicola* Kieffer.
109. *P. urticae* (Perris).
110. *P. vaccinivorum* Kieffer,
 = *vaccinii* Rübsaamen *non* Smith.
111. *P. veronicae* (Vallot),
 = *chamaedrys* Inchbald.
112. *P. viciae* (Kieffer).
113. *P. violae* (F. Loew).
114. *P. virgae-aureae* (Liebel).
115. *P. vitis-idaeae* Kieffer.

* * * *

116. *P. lithospermi* H. Loew.
117. *P. panteli* Kieffer.

Genus **Hartigiola** Rübsaamen.

1. *H. annulipes* (Hartig),
 = *piliger* H. Loew.

Genus **Taxomyia** Rübsaamen.

1. *T. taxi* (Inchbald).

Group Asphondylariae.

Genus **Schizomyia** Kieffer.

1. *S. galiorum* Kieffer.
2. *S. ligustri* Rübsaamen.

Genus **Kiefferia** Mik.

1. *K. pimpinellae* (F. Loew),
 = *umbellatarum* F. Loew.

Genus **Asphondylia** H. Loew.

1. *A. dorycnii* F. Loew.
2. *A. genistae* H. Loew.
3. *A. lupulinae* Kieffer.
4. *A. mayeri* Liebel.
5. *A. mikii* Wachtl.
6. *A. melanopus* Kieffer.
7. *A. ononidis* F. Loew.
8. *A. proxima* Kieffer.
9. *A. sarothamni* H. Loew.
10. *A. thymi* Kieffer.
11. *A. ulicis* Verral.

Group Brachyneurariae.

Genus **Phaenolauthia** Kieffer.

1. *P. cardui* Kieffer.

Genus **Mikiola** Kieffer.

1. *M. fagi* (Hartig),
 = *Tipula rubra* Hermann.

Genus **Brachyneura** Rondani.

1. *B. stygia* Walker (*nec* Meigen).*

* See Collin, 1904, note 3.

Group Cecidomyiariae.

Genus **Hormomyia** H. Loew.

1. *H. fischeri* Frauenfeld.
2. *H. frireni* Kieffer.
3. *H. grandis* (Meigen).
4. *H. kneuckeri* Kieffer.

Genus **Dishormomyia** Kieffer.

1. *D. cornifex* (Kieffer).

Genus **Trishormomyia** Kieffer.

1. *T. tuberifica* (Rübsaamen).

Genus **Cyrtodiplosis** Kieffer.

1. *C. crassinerva* (Kieffer).

Genus **Monarthropalpus** Rübsaamen.

1. *M. buxi* (Geoffrey).

Genus **Dichrona** Rübsaamen.

1. *D. gallarum* Rübsaamen.

Genus **Arthrocnodax** Rübsaamen.

1. *A. fraxinella* (Meade).

Genus **Aphidoletes** Kieffer.

1. *A. abietis* (Kieffer).

Genus **Anabremia** Kieffer.

1. *A. bellevoyi* (Kieffer).
2. *A. viciae* Kieffer,
   = *Clinodiplosis longiventris* Kieffer (larva, not imago).

Genus **Hadrobremia** Kieffer.

1. *H. longiventris* Kieffer,
   = *Clinodiplosis trifolii* Kieffer (larva, not imago).

Genus **Endaphis** Kieffer.

1. *E. perfidus* Kieffer.

Genus **Syndiplosis** Rübsaamen.

1. *S. lonicerearum* (F. Loew).
2. *S. petioli* (Kieffer).

Genus **Contarinia** Rondani.

1. *C. acetosae* Kieffer.
2. *C. anthobia* F. Loew.
3. *C. barbichei* Kieffer.
4. *C. betulicola* Kieffer.
5. *C. betulina* Kieffer.
6. *C. campanulae* Kieffer.
7. *C. coryli* Kieffer.
8. *C. craccae* Kieffer.
9. *C. cucubali* Kieffer.
10. *C. gei* Kieffer.
11. *C. helianthemi* (Hardy).
12. *C. heraclei* Rübsaamen.
13. *C. lathyri* Kieffer.
14. *C. linariae* (Winnertz).
15. *C. loti* (De Geer).
16. ? *C. medicaginis* Kieffer.
17. *C. melanocera* Kieffer.
18. *C. nasturtii* Kieffer.
19. *C. nicolayi* Rübsaamen.
20. *C. ononidis* Kieffer.
21. *C. pyrivora* (Riley).
22. *C. quercina* Rübsaamen,
    = *dryophila* Kieffer.
23. *C. rubicola* (Kieffer) Rübs.
24. *C. ruderalis* Kieffer.
25. *C. scabiosae* Kieffer.
26. *C. scoparii* Rübsaamen.
27. *C. sorbi* Kieffer.
28. *C. steini* Karsch.
29. *C. tiliarum* Kieffer.
30. *C. tragopogonis* Kieffer.
31. *C. traili* Kieffer.
32. *C. tremulae* Kieffer.
33. *C. tritici* (Kirby).
34. *C. valerianae* Rübsaamen.
35. *C. viburnorum* Kieffer,
    = *viburni* Kieffer *non* Felt.

Genus **Stictodiplosis** Kieffer.

1. *S. corylina* (F. Loew).
2. *S. hypochoeridis* (Rübsaamen).
3. *S. jacobaeae* (H. Loew).
4. *S. pilosellae* Kieffer.
5. *S. scrophulariae* Kieffer.
6. *S. umbellatarum* Rübsaamen.

Genus **Thecidodiplosis** Kieffer.

1. *T. brachyntera* (Schwägrichen).

Genus **Myricomyia** Kieffer.

1. *M. mediterranea* (F. Loew).

Genus **Zeuxidiplosis** Kieffer.

1. *Z. giardi* (Kieffer),
 = *giardiana* Kieffer.

Genus **Atrichosema** Kieffer.

1. *A. aceris* Kieffer.

Genus **Trichodiplosis** Kieffer.

1. *T. caricis* (Kieffer).

Genus **Antichiridium** Rübsaamen.

= *Antichira* Rübsaamen *non* Eschscholz.

1. *A. striatum* (Rübsaamen).

Genus **Lestodiplosis** Kieffer.

1. *L. callida* (Winnertz).
2. *L. centralis* (Winnertz).

Genus **Pseudhormomyia** Kieffer.

1. *P. granifex* Kieffer.

Genus **Taphodiplosis** Kieffer.

1. *T. subterranea* (Kieffer *et* Trotter).

Genus **Dyodiplosis** Rübsaamen.

1. *D. arenariae* (Rübsaamen).

Genus **Loewiola** Kieffer.

1. *L. centaureae* (F. Loew).

Genus **Putoniella** Kieffer.

1. *P. marsupialis* (F. Loew).

Genus **Haplodiplosis** Rübsaamen.

1. *H. equestris* (B. Wagner).

Genus **Cecidomyia** Meigen.*

1. *C. pini* (de Geer).†
2. *C. flava* Meigen.
3. *C. verna* Curtis.

Genus **Macrodiplosis** Kieffer.

1. *M. dryobia* (F. Loew).
2. *M. volvens* Kieffer.

Genus **Xenodiplosis** Felt,

= *Allodiplosis* Rübsaamen *non* Kieffer.

1. *X. laeviusculi* (Rübsaamen).

Genus **Parallelodiplosis** Rübsaamen.

1. *P. galliperda* (F. Loew).

Genus **Harmandia** Kieffer.

1. *H. tremulae* (Winnertz).
2. *H. pustulans* Kieffer.

Genus **Clinodiplosis** Kieffer.

1. *C. betonicae* Kieffer.
2. *C. botularia* (Winnertz).
3. *C. rosiperda* (Rübsaamen).
4. *C. schlechtendali* Rübsaamen.

Genus **Mycodiplosis** Rübsaamen.

1. *M. coniophaga* (Winnertz).

Genus **Massalongia** Kieffer.

1. *M. rubra* (Kieffer).

Genus **Ametrodiplosis** Rübsaamen.

1. *A. thalictricola* (Rübsaamen).

Genus **Monodiplosis** Rübsaamen.

1. *M. liebeli* (Kieffer),
 = *Schizomyia sociabilis* Rübs.

Genus **Atylodiplosis** Rübsaamen.

1. *A. rumicis* (H. Loew).

Group Porricondylariae.

Genus **Dirhiza** H. Loew.

1. *D. rhodophila* (Hardy).

Genus **Porricondyla** Rondani.

1. *P. longipes* (H. Loew).

* All species in this genus, excepting the type *pini*, are insufficiently described, and therefore cannot be relegated to any known genus.

† Synonyms are *laterella* Zett., *pilosa* Bremi, and *pini-maritimae* Dufour.

Subfamily *LESTREMINAE.*

Group Campylomyzariae.

Genus **Campylomyza** Meigen.

1. *C. globifera* Haliday.

Genus **Amblyspatha** Kieffer.

1. *A. ormerodi* Kieffer.

Group Lestremiariae.

Genus **Catocha** Haliday.

1. *C. latipes* Haliday.

Genus **Lestremia** Macquart.

1. *L. carnea* (H. Loew).
2. *L. fusca* Meigen.
3. *L. leucophaea* (Meigen), = *juniperina* Fabricius *non* Linné.

III. Index to Host-plants.

N.B.—The capital initials of *specific* plant-names are in accordance with the usual Botanical practice.

In using the following index it is well to note the following points: (1) that when a Cecidomyid galls all of the species of a plant genus, then that fact is notified thus, "Salix spp."; (2) that in a few cases an aggregate plant name is used; (3) that when any Cecidomyid feeds on rusts, smuts, mildews, aphids and the like, found on any particular plant, then these are indexed under the name of that plant; (4) that the numbers refer to the numbering of the Cecidomyid species in the classified list.

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Fellows pay an Admission Fee of £2 2*s*. The Annual Contribution is £1 1*s*., due on the first day of January in each year, and payable in advance; or a Composition Fee of £15 15*s*. may be paid in lieu thereof, the whole payment for Life Fellowship, including the Admission Fee, being £17 17*s*. Fellows residing permanently outside the United Kingdom pay no Admission Fee.

All Fees should be paid to the Treasurer, Mr. A. H. Jones, Shrublands, Eltham, Kent, and not to the Secretaries.

Fellows desiring to pay their Annual Contribution through their bankers can obtain an official form of banker's order by applying to either the Treasurer or to the Resident Librarian.

Fellows whose Contributions for the current year have been paid are entitled to receive the publications of the Society free of charge. Further copies may be purchased at reduced prices by applying to the Resident Librarian.

Forms of application for Fellowship and copies of the Bye-laws and List of Fellows may be obtained from either of the Secretaries or from the Resident Librarian.

MEETINGS AND EXHIBITIONS.

Intending exhibitors are required to signify their names and the nature of their exhibits to the Chairman before the beginning of the meeting, in order that they may be called upon from the chair. Descriptive notes of all exhibits should be handed to the Secretaries at the same meeting for printing in the Proceedings. If the epidiascope is required a week's notice must be given; exhibits to be satisfactorily focussed by this instrument must not exceed 7 ins. square.

Fellows resident abroad, or who are otherwise unable to attend, are reminded that any specimens, notes, or observations they may send to the Secretaries will be considered by the Council, with a view to exhibition or reading at the meetings of the Society.

PAPERS AND ILLUSTRATIONS.

Fellows desiring to communicate papers to the Society must send the full titles of such papers either to the Secretaries at the Society's rooms, or to Commander J. J. Walker, M.A., R.N., Aorangi, Lonsdale-road, Summertown, Oxford, at least fourteen days prior to the date of the meeting at which it is proposed that such papers shall be read.

Authors proposing to illustrate their papers should communicate with the Secretaries before the drawings are executed. The Council recommend that the size of the work on plates should be limited to 6¼ ins. by 4 ins., and in no case will it be allowed to exceed 6½ ins. by 4¼ ins.

Attention is called to the Instructions to Authors issued with Part I of each volume, which may also be obtained of the Resident Librarian. Inattention to these regulations may involve an author in considerable expense.

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TO BE HELD IN THE SOCIETY'S ROOMS

11, CHANDOS STREET, CAVENDISH SQUARE, W. 1

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The Chair will be taken at Eight o'clock.

THE LIBRARY

is open to Fellows and their friends every day from 9 a.m. to 6 p.m., except Saturdays, when it closes at 2 p.m. On the nights of meeting it remains open until 10 p.m.

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PART V. December 10, 1918.

THE

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

1917.

LONDON:

SOLD AT THE SOCIETY'S ROOMS, 11, CHANDOS STREET,

CAVENDISH SQUARE, W.,

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THE ENTOMOLOGICAL SOCIETY OF LONDON.

Founded, 1833. Incorporated by Royal Charter, 1885.

PATRON—HIS MAJESTY THE KING.

TRANSACTIONS OF THE ENTOMOLOGICAL SOCIETY OF LONDON.

Some of the early volumes of the Society's Transactions are out of print, but those which are in stock can be obtained at reduced prices. Any single volume of the present series, 1868–1887, is sold at 10*s.* to Fellows. The volumes for 1868–1890, in sets of not less than five, as well as the five of the Third Series (1862–1867), can be obtained by Fellows at greatly reduced prices on application to the Librarian. The following is a price list of recently published parts of the Transactions—

1912.—Part I, £1 4*s.*, to Fellows, 18*s.*; Part II, 14*s.* 6*d.*, to Fellows, 10*s.* 9*d.*; Part III, £1 4*s.*, to Fellows, 18*s.*; Part IV, 7*s.* 6*d.*, to Fellows, 5*s.* 9*d.*; Part V, 5*s.*, to Fellows, 3*s.* 9*d.*

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The following may be obtained separately:—

Pascoe's '*Longicornia Malayana,*' forming vol. iii. of the Third Series, published price, £2 12*s.*; to non-Fellows, £1 10*s.*; to Fellows, £1.

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THE

PROCEEDINGS

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THE

PROCEEDINGS

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LONDON

FOR THE YEAR 1917.

Wednesday, February 7th, 1917.

Dr. C. J. GAHAN, M.A., D.Sc., President, in the Chair.

Nomination of Vice-Presidents.

The PRESIDENT announced that he had nominated Dr. T. A. CHAPMAN, Dr. G. B. LONGSTAFF and the Honble. N. CHARLES ROTHSCHILD as Vice-Presidents for the ensuing year.

Death of a former President.

The President also announced the death of Mr. C. O. WATERHOUSE, a former President of the Society, and a vote of condolence with his daughter was passed on the motion of Mr. CHAMPION, seconded by Mr. BETHUNE-BAKER.

Election of a Fellow.

Mr. A. W. RYMER ROBERTS, M.A., Rothamsted Agricultural Experiment Station, Harpenden, and The Common, Windermere, was elected a Fellow of the Society.

New Bye-law read.

The new Bye-law proposed by the Council was read for the third time.

Exhibitions.

Lepidoptera from Salonica.—Mr. A. H. Jones exhibited on behalf of Captain E. F. Studd, R.F.A., a Fellow of the Society, at present serving with the British Expeditionary Force at Salonica, various Lepidoptera taken by him in 1916, in the neighbourhood of Salonica. He also furnished notes relating to these captures and other species observed by him.

Papilio podalirius, not uncommon on the mountains near Güvezne on June 1.

Papilio machaon, at Lembet, in April, apparently similar to British specimens; a fresh specimen taken on Sept. 17, near Senikos.

Aporia crataegi, common, May 16, Lembet.

Pieris brassicae, common (larger than English specimens); *P. rapae* and *P. napi*, common, apparently typical; *P. daplidice*, occasionally met with in June, Akunbar, common from Aug. 31 until Oct. 8.

Colias edusa, quite common, still flying plentifully on Nov. 19; one var. *helice* seen at Lembet.

Gonepteryx rhamni, several males seen, one on Nov. 18.

Nordmannia (*Thecla*) *ilicis* var. *cerri*, May 30, near Güvezne.

Chrysophanus dispar var. *rutilus*, two ♂s taken among rushes in Langaza Lake, in about two feet of water. They were the only ones seen, just at this one spot surrounded on all sides by water.

Rumicia phlaeas, seen occasionally; common in Oct., and still seen up to Nov. 18.

Aricia medon (*Polyommatus astrarche*), *Polyommatus icarus*, *Plebeius argus*, common, June 2, near Güvezne.

Vanessa io, *Pyrameis atalanta* (first seen April 14, last seen Nov. 1), common.

Pyrameis cardui, not uncommon, last seen Sept. 17.

Melitaea didyma var. *occidentalis*, one ♂ June 23, Akunbar; *M. trivia*, two ♂s May 31, near Güvezne.

M. phoebe, common.

Brenthis selene and *Issoria lathonia*, not scarce.

Melanargia larissa, May 16 to June 3, Lembet; not uncommon.

Satyrus semele common on mountains.

Pararge megaera, common and typical.

Epinephele jurtina, abundant on mountains; *E. tithonus*, not uncommon.

Coenonympha pamphilus, very abundant, still out on Nov. 19.

Syrichthus malvae and *Nisoniades tages*, common.

Augiades sylvanus, several.

Protoparce convolvuli, taken in lines, Sept. 19.

Macroglossa stellatarum, occasionally seen.

Setina mesomella, *Lithosia complanula* and *Procris statices*, common.

Zygaena filipendulae and *Z. punctum*, locally common.

Noctua plecta, common.

Mania maura, in tent, Sept. 12.

Amphipyra livida, one specimen, Lembet, June 25.

Plusia gamma, came to lamp in tent, Nov. 14.

Acontia luctuosa, *Arctia villica* and *Coscinia striata* (*grammica*), common, locally, May 29, near Güvezne.

Zeuzera pyrina (*aesculi*), one ♂.

Aspilates ochrearia, common.

Acidalia ornata, occasionally seen.

Ematurga atomaria ♂, locally; the yellow coloration of Wicken specimens.

Cabera pusaria and *Pellonia vibicaria*, several; *Abraxas grossulariata*, one specimen only.

Anaitis plagiata and *Cidaria fluctuaria*, common.

Camptogramma bilineata, common.

Commander Walker said that many years ago he had taken almost all the species exhibited in the neighbourhood of Port Baklar, at the head of the Gulf of Xeros, near the Boulair Lines. He had found the larvae of *M. trivia* feeding on *Verbascum* in the greatest abundance. The only species he had not met with there was *C. dispar*; he remarked on the very small size of the specimens of this species; those of *M. larissa* were, on the other hand, exceptionally large.

The President and Mr. W. G. Sheldon commented on the abundance of butterflies in Macedonia, the latter observing also that North Macedonia and Albania were among the least known of European localities for Lepidoptera.

LOCAL FORMS OF AGRIAS CLAUDIA.—Mr. G. TALBOT exhibited on behalf of Mr. J. J. JOICEY a series of *Agrias claudia*, Schulz, showing its distribution and local forms. These include the forms *sahlkei*, Honr., *claudia*, Schulz, and *amazonica*, Stgr., all from St. Jean de Maroni, French Guiana. *A. claudia* is the Surinam race, and *amazonica* an Amazon race, which are thus shown to occur in French Guiana as aberrations, the form *sahlkei* representing the Guiana race.

A transitional series may be shown to connect the various races.

The distribution of *claudia* follows the coast, river-valleys and foot-hills. It ranges from Dutch Guiana in the north to South Brazil in the south. It extends eastwards to Ecuador, Peru and Bolivia.

SOME BRITISH RHOPALOCERA.—Dr. E. A. COCKAYNE exhibited :—

(1) A series of *Pararge egeria*, bred Nov. and Dec. 1916 and Jan. 1917 from ova laid by several females taken in August, at Limber, N. Lincolnshire. They showed considerable variation. Most of them had very large yellow spots. One female had a great extension of the yellow colour and thin scaling over the central portions of all four wings. One underside aberration was very dark with a deep brown band on the hind-wing.

(2) An aberration of *Polygonia c-album* taken by Lord Garrick in Sept. 1916 in Montgomeryshire, the hind-wings being nearly black and the fore-wings with costal spots united into a crescent.

(3) A Gynandromorph of *Polyommatus icarus*, a dark female except for stripe and blue scales, with androconia from the base to the termen of the left fore-wing; taken at Royston, Aug. 1916.

(4) A Gynandromorph of *P. icarus* with a stripe of bright blue scales on the right fore-wing; *no* androconia; taken at Folkestone, June 1915.

(5) A female *Agriades coridon* with one hind-wing marked

with blue like ab. *semisyngrapha*, the other hind-wing having only a thin sprinkling of blue scales over the same area; taken at Royston, Aug. 1916.

Further Note dealing with the question of the specific identity of Pediculus capitis and Pediculus humanus (vestimenti).—Mr. Bacot read the following note:—

"At a previous meeting (see p. xiv, 1916), when referring to this question, I suggested that the disparity in the proportions of the sexes in the F. 1 generation resulting from a cross pairing between a *P. capitis* ♂ and *P. humanus* ♀ lent support to the view that these insects were distinct species. In a subsequent conversation the Rev. James Waterston challenged this view, on the ground that it was necessary to prove that normal sex-proportion resulted from pairings within the two races, a point I had taken for granted, owing to the parity of the sexes in my stock boxes. I have now obtained details of the sex-proportions of a number of broods of *P. humanus*, which I propose to lay before you. Paired couples of *P. humanus* were taken from a stock box, segregated in small boxes, and their offspring reared to maturity, with the following result:—

No. of Pairs.	♂♂	♀♀
1	1 = 2%	43 = 98%
2	44 = 49%	46 = 51%
3	31 = 65%	17 = 35%
4	Nil.	67 = 100%
5	119 = 73%	43 = 27%
6	39 = 66%	20 = 34%
7	116 = 68%	55 = 32%
8	Nil.	46 = 100%
9	54 = 92%	5 = 8%
10	Nil.	49 = 100%
11	10 = 71%	4 = 29%
12	Nil.	39 = 100%
13	Nil.	48 = 100%
14	7 = 9%	74 = 91%
15	42 = 68%	20 = 32%
	463 = 45%	576 = 55%

In a numerous colony of a gregarious insect casual sex-production on the part of any given pair will result in a nearly equal proportion of ♂♂ and ♀♀, and might serve to minimise the dangers of too close inbreeding. In this series, however, sex-production does not appear to be entirely casual, as there is an evident bias on the ♀♀ side.

The sex-percentages of the F. 1 generation of four cross pairings between ♂ *P. capitis* and ♀ *P. humanus* are as follows :—

Pair.	♂♂	♀♀
No. 1	71 = 74%	25 = 26%
No. 2	130 = 86%	22 = 14%
No. 3	51 = 51%	49 = 49%
No. 4	76 = 68%	35 = 32%
	328 = 71%	131 = 29%

It will be seen that in this series the bias is heavily on the ♂ side, which is possibly due to the effects of crossing. I must admit, however, that in view of the erratic percentages from normal pairings of one of the parent races my argument on the basis of abnormal sex-production on the part of the hybrid insects can carry but little weight.

An experiment dealing with the egg-laying instincts of the two species affords clearer evidence. The following method was adopted. Glass-bottomed boxes of 1½ inch diameter and ½ an inch deep, were lined on the vertical sides with a strip of flannel, such as is used for Army shirts, human hairs being placed in central area so as to form a web, but not a felted mass. The hairs came in contact with the glass bottom, the flannel-lined sides and the gauze cover through which the lice were fed. An equal number of pairs of *P. capitis* and *P. humanus* were placed in each box. At the end of a week the ♀♀ of *P. capitis* had laid 80% of their eggs on the hair and 20% on the flannel, while the *P. humanus* ♀♀ had laid 20% on the hair and 80% on the flannel. As the insects had been taken from congested stock boxes that had been in use for many months, the *P. capitis* box containing a felted mass of hairs and the *P. humanus* box a rolled flannel strip which filled the box, it is possible that their egg-laying instincts had been dulled during captivity under these conditions. The eggs laid were separated into four lots: *P. humanus* laid on hair, *P. humanus* laid on flannel, *P. capitis* laid on hair, and *P. capitis* laid on flannel. Individuals were reared from these eggs, and 12 ♂♂ and 12 ♀♀ of each lot were placed in boxes containing human hairs and lined with flannel, similarly to those used in the former experiment. After five days, during which all four batches were fed and exposed to the same conditions, the eggs were counted and their positions recorded as follows :—

P. humanus, bred from eggs laid on hairs :—

12 and 12 produce 359 eggs.	on hairs	38 = 11%
	on gauze cover of box . . .	1
	on flannel, side next box . .	37 = 10%
	on flannel, exposed side . .	283 = 79%

The eggs were laid on hairs only where these came in contact with flannel.

P. humanus, bred from eggs laid on flannel :—

12 and 12 produce 344 eggs.	on gauze cover of box . . .	4 = 1%
	on flannel, side next box . .	55 = 16%
	on flannel, exposed side . .	285 = 83%

P. capitis, bred from eggs laid on hairs :—

12 and 12 produce 274 eggs.	on gauze cover of box . . .	1
	on flannel, exposed side only .	14 = 5%
	on hairs	259 = 95%

P. capitis, bred from eggs laid on flannel :—

12 and 12 produce 390 eggs.	on gauze cover of box . . .	4 = 1%
	on flannel, exposed side only .	2 = ½%
	on hairs close to flannel . .	2 = ½%
	on hairs	382 = 98%

Although this result leaves the question of specific identity still undetermined, it suggests that there is a clear line of demarcation as regards the egg-laying instinct, provided the insects are left an element of choice.

SPECIAL MEETING.

The Special Meeting summoned to consider the new Bye-law proposed by the Council was then held.

The Secretary read the proposed Bye-law, which runs as follows :—

" Chap. xxiii. *Prohibition in respect of Funds.*

" The Society shall not and may not make any dividend, gift, division or bonus in money unto or between any of its members."

This Bye-law was needed to comply with the Act of Parliament regulating the Registration of Scientific Societies so that they may be free from local rates.

On the motion of Mr. Bethune-Baker, seconded by Mr. Stanley Edwards, it was passed without discussion.

Wednesday, March 7th, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Death of a Member of Council.

The death of Mr. A. E. Gibbs, a member of the Council, and for five years a most valued member of the Business Committee, was announced.

Exhibitions.

South Indian Hemiptera, &c.—Mr. E. A. Butler exhibited two species of S. Indian Hemiptera received from Mr. T. V. Campbell, M.B., who captured them at Chikkaballapura in the Mysore State; viz. :—

(1) *Urentius echinus*, Dist., a species of *Tingididae*, which is a pest feeding on the leaves of the Egg-Plant (*Solanum melongena*), the larvae living on the under-side of the leaves, and the adult insects on the upper.

(2) *Apollodotus praefectus*, Dist., a species of *Capsidae*, which is found on the same plant, and the larvae of which prey upon those of the Tingid bug.

Also several recently described species of S. Indian *Fulgoridae*, together with the ♂ of *Eurybrachys tomentosa*, Fabr., which has only recently been recognised. In this sex the green colour of the tegmina has almost disappeared, the pale fasciae are almost obliterated, and the wings are dark with a white band on the apical area.

Notes on Mimicry in Oriental butterflies by Col. T. Jermyn.—Prof. Poulton said that he had recently received the following interesting notes, and had tried to induce the author to communicate them in person. Col. Jermyn, being unfortunately prevented from coming, had forwarded with his manuscript the illustrative specimens now exhibited to the meeting.

"I have one or two examples of mimicry, which have struck me for some time as rather specially interesting, in a collection of Indian butterflies made during the last twenty years or so. I have long intended to write to you regarding them, but going on duty again put them out of my mind. Being at home again, and having just read your very interesting address to the Linnean Society, I am now doing as I intended.

"1. *Two series showing steps in development of diaposematic or reciprocal resemblance between Papilio agestor, Gray, and Danais tytia, Gray.*—In the model *Danais* (*Caduga*) *tytia*, Gray, there is a characteristic black marking running from base of f.-w. along the costa across the end of the cell and along vein 4 to the margin. This is copied in typical *P. agestor* by a similar line, which, however, cuts diagonally across the cell at some distance before the end, and is, as far as I have seen, constant. In the specimens of *agestor govindra*, Moore, however, which I have from Mussoorie, this marking grades from almost complete absence to a perfect copy as in typical *agestor*. This marking seems to me interesting as being an attempt to obliterate part of the outline of the large Papilionine f.-w. cell, thus producing a superficial resemblance, in shape as well as size, to the smaller Danaine cell. It is also interesting that this mimetic feature is apparently not yet entirely established, or possibly is undergoing reversion, in the geographical race *govindra*.

" The specimens sent in illustration are five *govindra* from Mussoorie (4500 ft., Apr. 22, 1907), one *govindra* from Murree (6000 ft., Apr. 29, 1898) and one typical *agestor* from the Khasia Hills (1908). The first six are arranged to show a gradual transition in the development of the diagonal marking across the f.-w. cell and in the filling up basally of area 5 in the f.-w. with black, in mimicry of area 4 in the model *tytia.* The same series also shows the cutting off by a black lunular line of a row of submarginal spots from the Papilionine streaks in f.-w. areas 1–4 to match those in *tytia.*

" A series of the model *D. tytia*—one from Chakrata (Sept., 1893), four from Tehri Garhwal, near Mussoorie (May 1–8, 1907) —has been arranged to show the gradual disappearance of the black lines separating the discal and postdiscal spots in f.-w. areas 2 and 3, thus matching the streaks in *agestor.* The three characteristic spots in areas 2 and 3 of this Danaine group (conf. *melanea,* Cram., *aglea,* Cram., and *melanoides,* Moore, sent herewith) and the Papilionid streak have thus by reciprocal variation become a spot and a streak in the interspaces of both species, the *Papilio* producing a submarginal spot out of the end of its streak, the *Danais* producing a streak by the fusion of its discal and postdiscal spots.

" Some of the imperfections, due to difficulties of structure, etc., seem almost more interesting than the perfections. *D. tytia,* in reducing the black pigment, has lost the streaks in the interspaces, common to both families, and fairly prominent in *agestor.* The difference in the arrangement of the median and discoidal nervules seems to be a cause of cross-purposes. *Agestor* is filling f.-w. area 5 with black in imitation of area 4 of *tytia,* while *tytia* seems to be clearing area 4 in imitation of the same area in *agestor.* On the hind-wing the difference in size of the respective cells seems to be the cause of a great deal of variation in the proportion of reddish colouring. Papilios and Pierids seem to have considerable difficulty in accurately copying the markings about the ♂ Danaine scent-glands; Nymphalines are much more successful.

" *Calinaga buddha,* Moore, appears to be an outlying member of the *tytia-agestor* combination. It has no red on the wings, but its red thorax is very conspicuous, and in the only valley I have found it (the only place, I think, where it has been seen in any numbers) it used to be out in the early spring with *agestor*, and looked distinctly like it.

"2. *Some points in the mimetic resemblance of the Nymphaline Parhestina jermyni, H. H. Druce, to the Pierine Aporia agathon, Gray, race phryxe, Boisd.*—One specimen of *P. jermyni* was taken on June 19, 1907, in the Tons valley behind Chakrata, beyond Mussoorie, N.W. Himalayas, with a number of *A. phryxe*, flying about a small detached clump of trees and shrubs. Another (sent for exhibition) was taken on June 25, 1907, further up the valley, flying by itself in bold circles of half a mile or so, round the junction of a smaller stream with the Tons. It was obviously not *A. phryxe*, and was secured on its third circle. One of the specimens of *phryxe* shown was taken with the first *Parhestina* on the 19th, the other in the same neighbourhood later. The *Parhestina* forms an interesting contrast with *Papilio agestor*, because in the Nymphaline mimic the apparent size of the f.-w. cell has to be increased and not reduced as in the Swallowtail. The bars across the middle and end of the cell of *P. persimilis*, Westw., have disappeared entirely in *jermyni*, but there is a dusting of black scales to indicate the end of a larger cell. It may be inferred by comparing the sexes of *persimilis* that this latter marking, which has been regained or retained by *jermyni*, was the first of the three f.-w. bars to undergo reduction. The black dusting beyond the cell is undoubtedly useful in increasing the resemblance to the *Aporia* model, although as yet not nearly so dark. It is identical in both specimens, and can be clearly seen in Plate XXIX, fig. 1, of Trans. Ent. Soc., 1911, p. 187, where *P. jermyni* is described by Mr. H. H. Druce.

"3. *Use of proboscis of Parhestina persimilis, Westw., in mimicry of Aporia caphusa, Moore.*—I have watched at Mussoorie (4–6000 ft., 1906) one or two individuals of *P. persimilis* drinking with a crowd of *A. caphusa*. The resemblance is distinctly enhanced by the yellow proboscis of *persimilis*, which harmonises with the yellow spot at the base of the hind-wings in *caphusa*. This spot shows up much more than would be expected, when the wings are closed over the back. The proboscis of *persimilis* is very bright yellow in life, and when extended, and probably distended, in drinking, is quite conspicuous. In the dried specimens the yellow colour fades to a considerable extent. There is no yellow on the underside of *persimilis*, of which *D. limniace*, Cram., is the model (as is rendered probable by the resemblance to the pattern around the ♂ scent-glands). In *P. jermyni*, which is evidently a direct mimic of *phryxe*, there is a good deal of yellow on the h.-w. under surface. It is not suggested that the yellow colour of the proboscis has been evolved for the purpose; all Parhestinas have it in common with Hestinas and the yellow Dilipas. Its use in mimicking *Aporia* has possibly preserved it. It does not occur in *Euripus*.

"4. *Synaposematic associations of blue Euploeas, &c., taken on the same day.*—I am sending you one or two sets of mimetic species caught on the same date, as I saw in your separata you were collecting such groups. All are common, but you may not have the following five blue Euploeas taken together: *mulciber*, Cram., *klugii*, Moore, *hopei*, Feld., *harrisi*, Feld., and *splendens*, Butl. *Mulciber* was in swarms, but it was quite difficult to get the others, especially the last two, out of the throng. I only got one *Papilio telearchus*, Hew. I am sorry I haven't got *Byblia ilithyia*, Drury, to complete the other little associations of *Telchinia violae*, F., and *Euthalia nais*, Forster, from Central and S. India. I have never found it common and have only two bad specimens, both from Sangor, Central Provinces."

Prof. Poulton when exhibiting the specimens sent by Col. Jermyn remarked that the example of *Papilio agestor govindra* from Murree was transitional between the five from Mussoorie and the typical *agestor*, not only in the development of the diagonal f.-w. marking, but also in the amount of brown pigment in the h.-w. and in the size of the specimen. It would be interesting to compare a long series from these two localities. The associated characters in which the Mussoorie specimens differed from the typical *agestor* rendered it far more probable that the butterflies from this locality were truly ancestral than that they had undergone reversion.

With regard to *Calinaga buddha* it was very interesting that Col. Jermyn had noted in the field the resemblance to the *tytia-agestor* combination. It could hardly be doubted that the Calinagas were themselves models for certain Chinese and N. Indian Chalcosiine moths in which the reddish thorax of the butterfly was represented by a patch of colour—orange-brown in dried specimens—at the extreme base of the fore-wings. Thus *Chelura dejeani*, Oberth., and *Agalope davidi*, Oberth., probably mimicked *Calinaga davidis*, Oberth.; *Chelura eronioides*, Moore—*Calinaga saka*, Moore; and *Ch. basiflava*, Moore—*Calinaga gautama*, Moore. Furthermore, the patterns of these Chalcosiine moths were associated with other species of the same subfamily, which seemed to bear no direct mimetic relationship with the Calinagas. The patterns of these anomalous butterflies appeared to belong to a large combination of Lepidoptera, including *Danainae*, *Nymphalinae*, *Pierinae*, possibly one or more species of *Parnassius*, and day-flying moths. In addition to this relationship, probably for the most part Müllerian, there was the resemblance to the *tytia-agestor* association, observed by Col. Jermyn.

With regard to the combination of blue Euploeas, which had been captured in the Naga Hills, Assam, on June 2, 3, and 5, 1908, Prof. Poulton said he had long wanted to obtain examples of the species which could be caught flying together at the same time and place; also notes as to their relative numbers. It was especially interesting that the central dominant member of the combination exhibited to the meeting should be the male of *Euploea* (*Trepsichrois*) *mulciber*, of which the female was quite different in appearance, and mimetic of a prevalent type of Danaine pattern (" Essays on Evolution," Oxford, 1908, pp. 334, 335).

Ammophila sabulosa, L., with only two submarginal cells to both fore-wings.—A male *A. sabulosa* with two instead of three submarginal cells in each fore-wing was exhibited to the meeting by Prof. Poulton. Mr. Charbonnier had first called attention to this interesting variation in the specimen, which had been captured by Col. Jermyn at Shapwick Heath, on June 13, 1914. The variation was all the more interesting because the presence of only two submarginal cells was, as Prof. Poulton had learned from the Rev. F. D. Morice, characteristic of a subgenus of *Ammophila*, which, however, did not include any British species.

The PRESIDENT stated that, at Prof. Poulton's request, he had recently examined the specimen from the Burchell collection (No. 1330), which was shown that evening, and he had no hesitation in saying that it was either a larva or female of the group Phengodini, a group placed by some authors in the Telephoridae and by others in the Lampyridae. The specimen had been exhibited on a previous occasion by the late Mr. C. O. Waterhouse, who was somewhat doubtfully of opinion that it was an Elaterid larva (see Proc. Ent. Soc. 1904, p. lxxxiv). Many years ago an insect supposed to be the larva of a *Pyrophorus* was exhibited at a meeting of the Society by the late Mr. Frederick Smith; and from the description of its luminous properties given (Proc. Ent. Soc. 1869, p. xv) there can be no doubt that that also was the female or larva of some species of Phengodini. The females of this group are completely larviform, and have the same short antennae, simple eyes, and short simple clawed legs that are met with in the larvae. Both larvae and females may be distinguished from Elaterid larvae by the fact that the tenth abdominal segment is somewhat conical or tubular in form, and projects beyond the ninth segment so as to be visible from above.

NEW CETONIIDS FROM BRITISH INDIA.—Mr. O. E. JANSON exhibited the four new species of *Cetoniidae* of the genera *Clerota*, *Pseudochalcothea*, and *Anatona*, described in the paper subsequently read, and made some remarks on their characters.

TEMPERATURE AT WHICH INSECT LIFE IS DESTROYED.—Mr. A. BACOT desired to call attention to a very valuable paper in the Memoirs of the Department of Agriculture in India (Nov. 1916, Vol. IV, No. 6) dealing with the insects attacking stored wheat in the Punjab, and the methods of combating them, by Barnes and Grove, and said: The authors show that the germinating powers of wheat submitted to a temperature of 70° C. for 24 hours were not noticeably impaired; as they found that heating to 100° C. generally destroyed the germinating power, it is to be presumed that the conditions of test were not entirely favourable to the grain, as I am told that wheat dried and exposed to heat under conditions of free transpiration of moisture can withstand a temperature of 120° C. I am surprised, however, that the authors do not refer to the heat necessary to destroy the insect pests. They deal with a number of chemical and some mechanical devices for destroying the insects, or freeing the wheat from them. Cannot dry heat be used? So far as my knowledge goes, the few insects which have been experimented on die at temperatures of 45° to 52° C. (= 113° to 125·6° Fahr.). Is it known whether the Coleoptera destructive of grain are specially adapted to heat, or is there some other reason which precludes this apparently simple and economical remedy being used?

Mr. J. C. F. Fryer said that he had worked out these temperatures pretty thoroughly, and found that 130°–140° Fahr. was always fatal to insects; their power of resistance was, however, very varied, and moist temperature proved less fatal than dry.

The President observed that in some French books a method was described for destroying grain weevils without interfering with the germinating power of the wheat. Waterhouse had experimented successfully on cotton.

Mr. Main pointed out that if the wheat was to be used for food, its germinating power was of no moment.

Mr. Willoughby Ellis observed that 104° Fahr. was always fatal to Staphylinid beetles.

Mr. Durrant suggested that heat was most fatal when applied in shocks; but Mr. Bacot said that he had not found this to be the case with mosquito larvae.

Dr. Chapman narrated an incident that occurred to him many years ago, when, having immersed a number of beetles in boiling water to kill them, a specimen of *Carabus clathratus* had recovered the next day, and eaten most of the other insects.

Gift of a Microscope.

The Secretary said that Mr. E. E. Green had offered to the Society a valuable Binocular Microscope, for which objectives of 2″ to $\frac{1}{6}$″ were required, and asked whether any Fellow had spare objectives which he would present.

Papers.

The following papers were read :—

" On new and little-known *Lagriidae* from S. America," by G. C. Champion, A.L.S., F.Z.S., F.E.S.

" Additions to the Knowledge of the *Cetoniidae* of British India," by O. E. Janson, F.E.S.

" The Condition of the Scales in leaden Males of *Agriades thetis* and other Lycaenids," by E. A. Cockayne, M.A., M.D., F.E.S.

" Some Notes on Butterfly Migrations in British Guiana," by C. B. Williams, M.A., F.E.S.

Commenting on Dr. Cockayne's paper Mr. Bethune-Baker observed that the scales in these specimens were curved triangularly and were very thin instead of fairly solid. Mr. Newman said that such specimens needed to be set at once, if killed with cyanide and relaxed they began to stain in less than six hours, and that this was the case even if kept in a dry cyanide bottle.

Prof. Poulton, Rev. G. Wheeler, Comm. Walker and Mr. Bethune-Baker commented on Mr. Williams' paper.

Wednesday, March 21st, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Election of Fellows.

Messrs. David Hunter, M.A., M.B., The Coppice, Nottingham; Nicholas J. Kusnezov, The Imperial Academy of Sciences, Petrograd, and Percy A. H. Muschamp, Charterhouse School, Godalming, Surrey, were elected Fellows of the Society.

Exhibitions.

A supposed Hybrid Butterfly.—Dr. T. A. Chapman exhibited a supposed hybrid between *Callophrys avis* and

Callophrys rubi, which for the most part resembled *C. rubi*, but the knobs of the antennae had the red underside as in *C. avis*, and the androconial brand was rather of the *C. avis* form than that of *C. rubi*, but intermediate. The white eye borders were a little less brilliant than in *C. rubi*, and the white line on the underside, though distinctly that of *C. rubi*, was slightly nearer the base than usual in that species. The specimen was taken where the species flew together at Amélie-les-Bains, in April 1909. The specimen is now in the Museum at S. Kensington.

A NEW BRITISH ELATER.—Mr. DONISTHORPE exhibited two specimens of an *Elater*, from Ireland, not in the British list. One was taken by Mr. F. Bouskell and the other by himself in Co. Kerry, in June 1902. They had been recorded as *Elater pomonae*, Steph., but neither of the captors had ever been satisfied that they were that species. Mr. Donisthorpe suggested that they were either *E. praeustus*, F., or a new species. In the general collection at the British Museum were similar specimens mixed in the series of *E. praeustus*, the latter either being a very variable species, or an undescribed species was mixed with it in the National Collection.

He also exhibited a specimen of *E. pomonae* for comparison; this particular specimen being of interest because it has a fungus parasitic on it.

REAPPEARANCE OF SUNSET INSECTS AT DAWN.—Mr. COLLIN said that he had observed that certain Diptera usually to be seen about sunset were also on the wing about dawn, and enquired whether the same fact had been observed in other Orders. Dr. CHAPMAN said that he was not aware that the fact had been observed with regard to Lepidoptera, and Mr. GREEN said that when he had been working light for moths all night, he had never found the early evening moths return in the morning; Mr. BUXTON and Mr. MAIN, however, both observed that *Hyria auroraria* flies both at dusk and dawn.

THE "DEATH-WATCH" BEETLES.—The PRESIDENT asked whether any Fellow could state from his personal knowledge that *Anobium domesticum* taps in the manner known as the "death-watch." *Xestobium tessellatum* and *Atropos divina-*

toria both tap with the mandibles, and this was shown by Derham to be a sexual call.

Wednesday, April 4th, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Election of Fellows.

Mr. Thos. W. Kirkpatrick, The Deanery, Ely, and Sir Charles Langham, Bart., Tempo Manor, Co. Fermanagh, were elected Fellows of the Society.

Exhibitions.

Forms of Papilio priamus.—Mr. G. Talbot exhibited on behalf of Mr. J. J. Joicey specimens of *Papilio* (*Troides*) *priamus* r. *coelestis*, Roths., from Rossel Island and St. Aignan, and the allied race *urvilleana*, Guér., from New Ireland and the Solomons. The specimen shown of *coelestis* from St. Aignan was very close to *urvilleana*. A ♂ *coelestis* from Rossel exhibited on the hind-wing the costal and discal yellow spots of the type-form, which reappear as an aberration in most *priamus* forms.

Ova of Stegomyia fasciata.—Mr. A. Bacot exhibited masses of eggs of *Stegomyia fasciata*, the "yellow-fever mosquito."

Living "Death-watch" Beetle.—The President exhibited a live specimen of *Xestobium tessellatum*, and demonstrated its marked power of "ticking" in response to tapping on the table on which the box stood in which it was contained.

Dr. Chapman, Comm. Walker and Mr. Durrant discussed the question as to whether *Anobium domesticum* possessed the same power.

Paper.

The following paper was read, illustrated by the epidiascope :—

"Revision of the Genus *Tarucus*," by G. T. Bethune-Baker, F.L.S., F.Z.S.

Wednesday, May 2nd, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Election of a Fellow.

Mr. Arthur Dicksee, 24, Lyford Road, Wandsworth Common, S.W. 18, was elected a Fellow of the Society.

Exhibitions.

A Centoniid from Madagascar.—Mr. O. E. Janson exhibited specimens of *Euchroea coelestis*, Burm., a rare and beautiful species of *Cetoniidae* from Madagascar, and directed attention to the remarkably brilliant pearly blue coloration of the underside of the body.

Genitalia of certain Species of Caligo.—Mr. W. J. Kaye exhibited two cases of *Caligo* species from the collection of Mr. J. J. Joicey as well as from his own collection, together with a number of microscopical mountings of the male genital organs (all prepared at the Hill Museum, where Mr. Joicey gave every facility) to prove that the forms, or hitherto supposed species, *atlas* from Ecuador and *prometheus* from Colombia, were really forms of *memnon* which more or less typically ranges throughout Central America, and that *telamonius*, Feld. (= *pavo*, Röb.) and *suzanna*, Stich., from Colombia, the former a mountain race, the latter from low elevations or coastal regions; *peleus*, Stich., from Venezuela, *cachi* from Costa Rica, *menes* from Chiriqui, *semicaerulea* from S.E. Peru, *joasa* from Upper Amazons, *insulanus* from Trinidad, *teucer* from Guiana, *phorkys* from Bolivia, are all really forms of the variable *teucer*. The point of difference in separating these two species lies in the long clasp having a serrate edge up to the apex in *memnon* and the tip terminating in two short teeth; while in all the forms of *teucer* the serrations stop before the tip, and at the extremity is a bunch of long hair instead of a pair of teeth. *Telamonius* at first sight looks very unlike typical *teucer* from Guiana, but specimens from Venezuela are intermediate in colour and those from Costa Rica are intermediate in size, while even on the coast of British Guiana specimens occur with an occasional inward suffusion of yellow over the wing. With *memnon* the same transitions in blue suffusion can be found linking up *prometheus* through *epimetheus* to the type form. *Atlas* from Ecuador is only like an enlarged *memnon.*

The errors made by Herr Fruhstorfer badly need correcting. *Menes*, Fruh., from Chiriqui, *peleus* from Venezuela, *telemonius*, Feld. (= *pavo*, Röb.), and probably *pavonides*, Fruh., from Eastern Colombia are all forms of *teucer* and not of *memnon*. As to *pavonides* I have no specimen to examine, but suspect it to be a form of *teucer*.

Then Herr Fruhstorfer makes *prometheus*, *epimetheus*, *atlas* and *anaximandrus* all forms of another species, while from the genitalia and the gradual transition of the forms to *memnon* there can be no doubt that they are all forms of that species. As *telamonius* was placed wrongly under *memnon* it becomes necessary to find what the form of *memnon* is that inhabits Colombia, and the answer without doubt is *prometheus*, with its aberration *epimetheus*. Felder, Reise Novara, p. 455, distinctly says that *prometheus* and *epimetheus* came in the same collection from Bogota; yet Fruhstorfer gives different subspecific rank to the two, and even in the same paragraph says that *epimetheus* comes from Eastern Colombia and the Western Cordilleras 2000 m.! It is, of course, possible that *epimetheus* occurs as a race somewhere, but for the elucidation of what species these *Caligo* represent Felder's information is illuminating. *Anaximandrus* has not been examined, as no specimen is available.

The undersides respectively of the *teucer* forms and the *memnon* forms agree pretty well all through, and an inspection of them alone might have saved a great deal of confusion. Messrs. Godman and Salvin in the Biologia Centrali-Americana, on Pl. xiv, figured what they called *telamonius* alongside with *memnon*, recording both from Panama, so it should have been clear that *telamonius* could not be a subspecies of *memnon*. The "*telamonius*" from Costa Rica we call *cachi*.

The following statement sets forth the facts as now revealed :—

Caligo memnon memnon, Feld.
Central America, Mexico to Nicaragua.
Caligo memnon atlas, Fruh.
Ecuador.
Caligo memnon prometheus, Koll., and v. *epimetheus*.
Colombia.
? *Caligo memnon anaximandrus*, Fruh.
W. Colombia.

Caligo teucer teucer, Linn.
Guiana.
Caligo teucer peleus, Stich.
Venezuela, Caracas, 3000 ft.
Merida, 5000 ft.
Caligo teucer menes, Fruh.
Chiriqui.
Caligo teucer cachi, J. and K.
Costa Rica.
Caligo teucer obidonus, Fruh.
Amazons, Obidos.
Caligo teucer joasa, J. and K.
Amazons, Joas Rio.
Caligo teucer semicaerulea, J. and K.
S.E. Peru.
Caligo teucer ecuadora, J. and K.
Ecuador.
Caligo teucer telamonius, Feld.
Colombia, Cauca Val.
Caligo teucer suzanna, Deyr.
Colombia coast.

Photographs of the Ovipositors of three Siricids occurring in Britain.—The Rev. F. D. Morice exhibited a set of six photos showing the ovipositor and apex of the ♀ abdomen in three species or subspecies of the Siricid genus *Paururus*, viz. *juvencus*, F., *noctilio*, F., and *cyaneus*, F. Of these the two first are Palaearctic forms, whereas *cyaneus* belongs properly to the North American fauna. Yet it seems to occur not unfrequently in these islands; and the exhibitor had in fact seen many more specimens of it taken in Britain than of *juvencus*, though it is probably by no means so common as *noctilio*, and it is at least possible that in all cases, as certainly in some, its occurrence is simply due to the importation of American timber containing eggs or larvae before it was shipped.

The ♀ of *cyaneus* is easily separated both from *juvencus* and *noctilio* by the great length of its ovipositor, of which about a half projects beyond the dorsal apex of the abdomen, so that in this respect it rather resembles our common black and yellow *Sirex*, the well-known *gigas*, L. It differs also from *juvencus* and agrees with *noctilio* in having entirely black antennae, these in both sexes of *juvencus* being testaceous at the base. The ♂ is distinguishable from that of *noctilio* by the colour of the abdomen, being testaceous practically up to the apex, and in this character it agrees with *juvencus* ♂, nor could Mr. Morice at present suggest any satisfactory way of separating it from the latter, though the ♀♀ of the two forms differ so much that he could not believe them to be mere varieties of one species.

He also mentioned that on Sunday last (April 29th) he had been surprised by the premature emergence in one of his breeding-cages of a ♀ *Phymatocera aterrima*, which on the same day laid seventeen eggs in a stem of its proper plant (Solomon's Seal). He procured this stem by a stroke of good luck from a plant which had been forced in a greenhouse; his own plants, growing in the open air, were as yet hardly out of the ground at all.

He had watched the whole process of oviposition very carefully through a powerful lens, being desirous of correcting or confirming certain details of the account which he gave of the oviposition of this species in Proc. Ent. Soc. Lond. for 1911, as to some of which Dr. Chapman's later observations (Trans. Ent. Soc. 1914, pp. 173–184, and Ent. Rec. 1915, pp. 145–149) were not exactly in accordance with his own.

He had stated that between the formation of each pocket and the laying of an egg in it the terebra was lifted *altogether out of the stem* and afterwards introduced into it afresh. In the present case, as in those described by Dr. Chapman, this had not happened. The apex of the terebra never actually

1 2 3

1a 2a 3a

F. D. Morice, Photo. *Half-Tone Eng. Co. Ltd*

APEX OF FEMALE ABDOMEN IN SIREX (PAURURUS).

1. *P. juvencus* L., dorsal view.
1a. *do.* lateral ,,
2. *P. cyaneus* F., dorsal ,,
2a. *P. cyaneus* F., lateral view.
3. *P. noctilio* F., dorsal ,,
3a. *do.* lateral ,,

left the slit! Either, therefore, the exhibitor had been mistaken in his former observations (though they were made so carefully and repeated so often that he hesitated to believe this), or possibly the phenomena may really be different in different cases, as for instance when the stems operated upon differ in thickness, and therefore in the curvature of that part of their surfaces which is affected.

It has sometimes been stated that the attachments of the two so-called "saws" are such that when one of them advances the other must necessarily retreat. Frequent dissections of these organs had long made him feel sure that this was a mistake, and he could now say quite positively that it is so. On more than one occasion he distinctly saw one of the two blades advance and retire and again advance, while the other blade remained absolutely at rest with its apex touching the apex of the (motionless) supports.

He noticed also, on one occasion, that the cuticle became separated from the underlying substance of the stem *along a line which the advancing edge of the saw had not yet reached!* This had confirmed him in the belief he had always held, that the action of the "terebra" is not simply *cutting*, but includes a sort of *splitting*—in short, that it acts as a "wedge," and that in this part of its work the stout thick "supports" take at least as much share as the delicate and slender "saws."

Dr. Chapman and Messrs. E. E. Green and Bethune-Baker commented. The President and Mr. C. J. F. Fryer both observed that they had received larvae of *Sirices* from *growing* trees in England.

Further Note on the "Death-watch" Beetle.—The President remarked that the *Xestobium* which he had exhibited at the previous meeting was still living, and that he had discovered that it was a ♀. It had tapped when touched on the head with a bit of paper, and when this was continued had extruded its ovipositor.

Many different statements had been made by different observers as to the part of the head used in tapping; these were probably all correct, as the part of the head employed depends on the form of the surface tapped.

Mr. Donisthorpe commented on these observations.

Papers.

The following papers were read :—

"New and Little-known Heterocera from Madagascar," by Sir George Kenrick, Bart., F.E.S.

"A preliminary Catalogue of British *Cecidomyidae,* with special reference to the Northern Gall-flies," by R. S. Bagnall, F.E.S., and J. H. Harrison, M.Sc.

Wednesday, June 6th, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Election of Fellows.

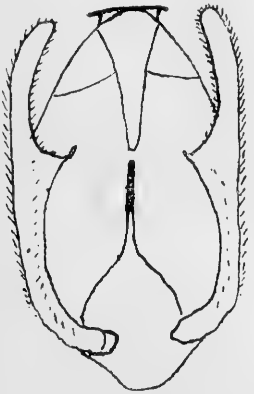
Dr. H. G. Breijer, Ph.D., Director of the Transvaal Museum, Pretoria, Transvaal, S. Africa, and Dr. Alfred E. Cameron, M.A., D.Sc., The Entomological Laboratory, Agassiz, British Columbia, were elected Fellows of the Society.

Exhibitions.

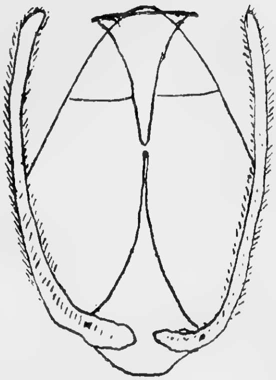
Two New British Coccids.—Mr. E. E. Green exhibited two new and (at present) undescribed species of British Coccidae, both belonging to the genus *Lecanium* and both occurring on the Birch (*Betula alba*).

One of them is quite a large and conspicuous insect. A single example of this species was taken, at Camberley, last year, when a diligent search failed to produce any further specimens. This year, however, the insect has turned up in comparative abundance, upon the stems and branches of young birch saplings. Its presence is rendered still more obvious by the attentions of a large ant (*Formica rufa*). In life, the dorsum of the insect is more or less covered with greyish-white cobwebby secretion which gives it a "mildewed" appearance. This secretion has been removed (by ether) from one of the examples exhibited, revealing the actual colour of the insect, which is seen to be bright castaneous, with a narrow black median longitudinal stripe and six or seven irregularly mottled black transverse bands. An example of the male puparium is also shown.

The second species is smaller, but very strongly convex—almost globose. Fresh examples exhibit ivory-white transverse bands on a dark brown background: but this pattern rapidly fades after the death of the insect. The colour pattern is somewhat similar to that of immature examples of *L. capreae*; but the insect now under consideration is fully mature, the scales covering masses of eggs. It is, moreover, considerably smaller than *capreae*. This species appears to be scarce. Repeated search has resulted in the discovery of four isolated individuals only.



Morpho adonis.



Morpho eugenia.

Morpho adonis and M. eugenia distinct Species.—Mr. W. J. Kaye exhibited *Morpho adonis*, three males and a fine female from British Guiana, also on behalf of Mr. J. J. Joicey *M. adonis* males and one ♀ from French Guiana, and *M. eugenia* males and one female also from French Guiana, together with preparations of the genitalia of both to show that there was no room for doubt that *M. eugenia*, Deyr., 1860, is a distinct species from *M. adonis*, Cram. He said, "The harpe of *adonis* is stouter than that of *M. eugenia* and is widened at the centre into a sharp toothed projection which is absent in *eugenia*; the harpe of *adonis* is also much straighter than *M. eugenia*, the latter being more curved. A glance at the figures will reveal the differences at once.

On June 7th of last year (1916) when Mr. G. Talbot exhibited *Morpho eugenia* under the name of *M. marcus*, I suggested that *M. eugenia* might possibly be the wet-season form of *M. adonis*. In the light of evidence of the genitalia this theory is untenable, as it is most unlikely that such great differences in the harpes could be accounted for seasonally. On the advice of Lord Rothschild I have also prepared the genitalia of *Araschnia levana* and its summer generation *prorsa* to test if there was any seasonal variation in these organs, but none was apparent. The settling of the specific distinctness has automatically removed a great deal of the nomenclatorial muddle. In British Guiana no male of *M. eugenia* has ever been recorded with certainty. But on the Potaro River *M. adonis* is fairly common, and the two females that were sent from there together with ten males by Mr. Roberts between the years 1902–1908 unquestionably are paired insects of the same species—*adonis*. Of the small number of *adonis* females that are available for examination it appears to be clear that the fore-wing apex is rather pointed and the anal angled projection rather pronounced. On this character it is pretty certain that Schaller's figure of *Papilio marcus* in Naturforscher, vol. 21, p. 174, pl. iv, ff. 1, 2 (1785) is the ♀ of *Morpho adonis*. Distant recognised this in 1881 in the Trans. Ent. Soc. for that year, p. 397. The figure which he gives, Pl. XX, really looks as if it might be a female of *M. eugenia*, and until a ♂ *eugenia* has been taken in British Guiana there must be a doubt if Distant's figure is a ♀ of *adonis* or *eugenia*. It certainly looks like a ♀ *eugenia* from its very large size and blunt fore-wing apex.

The synonymy of *Morpho adonis* is now as follows :—

♂. *Papilio adonis*, Cram., Pap. Ex., i, t. 61, A.B. (1779).
Morpho adonis, Godt., Enc. Méth., ix, p. 439, n. 3 (1823).
♀. *Papilio marcus*, Schall., Naturf., xxi, p. 174, n. 4, t. 4, f. 1, 2 (1785).
Zeuxidia marcus, Kirby, Syn. Cat. Diurn. Lep., p. 116, 8 (1871).
♂ ♀. *Morpho adonis*, Fruh. in Seitz, vol. v, p. 349 (1913) (= *eugenia*, Deyr. ♂) err. det.
Morpho adonis, Roths., Nov. Zool. xxiii, p. 317, 1916.

Lord Rothschild, with whom I have been in correspondence for some time over this matter, agrees that he was in error in retaining the name *marcus* for the pale broader-winged larger species that has recently been discovered in some numbers in French Guiana. The geographical races of *adonis* do not appear to be sufficiently well known, but the race named by Mr. Lathy as *major* from N. Peru also has a ♀ with pointed wings, although the insect is very large. From Iquitos there appears to be an intermediate race both in size and in the costal white spot which is smaller than in *major*, but larger than in *adonis adonis*. This form might be known as *intermedia*.

Morpho eugenia, Deyr., which until quite recently was so exceedingly rare and of which we were in so much doubt as to its specific distinctness, is now established as a perfectly good species. Apart from the differences of the genitalia the ♂♂ are easily separable by the more delicate silvery blue and the squarer outline of the wings. The ♀♀ such as are known are also of squarer build with the apex more blunt than in *adonis*, but otherwise the colouring seems to be the same. It is possible that the dark ground-colour of the hind-wing extends always well beyond the cell, while in *adonis* it is only up to or just beyond the cell. In a photograph of eight ♀♀ Morphos in the collection of Mdlle. de Florrack of Paris the upper four appear to be *adonis* by the sharp fore-wing apices and smaller size, and the lower four *eugenia* by the blunter fore-wing and larger size. The synonymy of *M. eugenia* is as follows :—

♂. *Morpho eugenia*, Deyr., Ann. Soc. Ent. Traver, Ser. iii, vol. 8, p. 209 (1860). (Oyapock, French Guiana.)

♀. *Morpho eugenia*, Bar., Ann. Soc. Ent. Traver, Ser. iv, vol. 4, p. 32 (1864). (Portal, Maroni River.)

♀. *Morpho eugenia*, Oberth., Etud. Ent. Liv. vi, p. 27, pl. vi, fig. 1 (1881).

?♀. *Morpho adonis*, Dist., Trans. Ent. Soc., pl. xx, figs. 1, 2, p. 397–399.

Morpho eugenia, Kirby, Syn. Cat. Diur. Lep., p. 122 (1871).

Morpho marcus marcus, Roths., Nov. Zool. xxiii, p. 317 (1916).

The only race that we know of for certain outside the type form is *Morpho eugenia uraneis*, Bates, from the Peruvian Amazons.

In the Novitates Zoologicae, vol. xxiii, p. 317 (1916), Lord Rothschild correctly surmised the specific distinctness of *eugenia* and *adonis* with the placing of the races of each, but called *eugenia* "*marcus*," thinking the two names applied to the same insect. Mr. Lathy has obtained from the collectors in French Guiana the following interesting notes on *eugenia* and *adonis*. "They are both taken at the same time, though *M. eugenia* disappears at times, while *M. adonis* appears to be found all the year round. They are also different in habits, as *M. eugenia* is only to be captured at daybreak, and after about a quarter of an hour it flies too high to be taken."

I should like here to acknowledge the generous help of Mr. Joicey, who put the whole of his specimens at my disposal for examination and dissection notwithstanding the great rarity of the specimens; also to Lord Rothschild, for help by correspondence, which has contributed to thresh out this difficult problem.

[NOTE ON MORPHO EUGENIA, DEYR., BY LORD ROTHSCHILD, F.R.S.—When I stated, Novit. Zool., vol. xxiii, p. 317, that the *Morpho* described by Deyrolle in 1860 must stand as *marcus*, Schaller, 1785, I gave as my reason that we only knew a brown and white-banded ♀ taken in copulation with an undoubted ♂ of Deyrolle's *eugenia*. Bates has also stated that he saw ♀ *adonis* flying, and that they were lavender grey. I now, however, on further study of material not available at the time I wrote, agree with Mr. Kaye that the ♀♀ both of *adonis* and *eugenia* are brown and white-banded. Seeing also that the *adonis* ♀♀ have pointed apices to the fore-wings, and Schaller's picture shows this clearly, I think his name is a pure synonym of *adonis*, Cram., and the rounded winged silvery blue insect must stand as *Morpho eugenia*, Deyr.]

RESEMBLANCE, MIMETIC AND NON-MIMETIC.—Mr. G. TALBOT, on behalf of Mr. J. J. JOICEY, exhibited :—

1. A white-banded mimetic group of African Heterocera from the Cameroons, composed of *Massaga maritona*, Butl.,

and *Massaga* sp.? (*Agaristidae*), *Hypochrosis massagaria*, Karsch (*Geometridae*), and *Ommatothelxis grandis*, Druce (*Tineidae*).

2. An example of resemblance which is not mimetic, seen in *Scoriopsis infumata*, Warr., from Peru, a Geometrid bearing a strong likeness to a species of *Lymantriidae* from Angola.

3. A mimetic group from Dutch New Guinea.—Species of *Tellervo*, which are essentially Danaine in character, probably serving as models for the ♂ of the Satyrine, *Drusillopsis dohertyi*, Ob., and with which is associated the black and white *Neptis*. Another resemblance appears to exist between the ♀ of *D. dohertyi* and species of *Hyantis* and *Taenaris* belonging to the *Amathusiidae*.

4. Two forms of *Tellervo* from the Island of Misol. This is further confirmatory evidence of the existence of at least two species in this puzzling genus. Fruhstorfer and Van Eecke have declared their opinions that only one species exists, but Lord Rothschild has noticed the occurrence of two forms from one locality in the Snow Mountains, Dutch New Guinea, and Mr. Joicey has received two forms from Biak Island.

5. *Papilio erlaces*, with its races, including a new race from North Peru, and showing the mimetic ♀ of *P. harmodius*, Doubl., from the same district.

BIRDS CAPTURING BUTTERFLIES ON THE WING AT OXFORD.—Prof. POULTON said that on the previous day (June 5) Mr. H. Britten had seen a swallow capture a Lycaenid butterfly. It was rather a curious coincidence that the observation was made from a window in the Hope Department, where so much attention had been devoted to this subject. The dodging flight of the butterfly made its capture difficult even for such a bird as the swallow, which only succeeded at the third attempt. The Lycaenid was bright blue and flying high opposite the window, in the afternoon. The bird was a male.

Prof. Poulton said that, after the above note had been written, as he was bicycling to the Museum that morning, a bird darted from out a garden and struck a Pierine, flying heavily after rain, close by him—so close in fact that the bird was frightened by the bicycle, and darted back, leaving the butterfly fluttering in the road. He got off his bicycle and, looking back, saw the bird return and carry the insect into the garden. When he tried to come to closer quarters the bird flew up into a tree and finally, still carrying the butterfly, across the road. The butterfly was *P. napi* or *rapae*, almost certainly the latter. The bird could not be observed very clearly, but from its size, colour, markings (so far as seen), and flight, was evidently a female chaffinch. The persistent pursuit in both these observations was worthy of note.*

FORMS OF PAPILIO POLYTES ROMULUS, CRAM., FROM SINGAPORE ISLAND AND THE MAINLAND OPPOSITE.—Prof. POULTON exhibited the mimetic *polytes*, L., females of two series recently sent to him by Dr. R. Hanitsch of the Raffles Museum, Singapore, in extension of his earlier consignment, captured Jan.–May, 1916, and analysed in our Proceedings for 1916, pp. lxxvi–lxxviii. The larger of the two series, analysed on p. xxxi, was from the island.

The non-mimetic females, *cyrus*, were thus less abundant than in the series captured Jan.–May, 1916, when they approximately equalled (8 to 9) the mimetic females.

The mainland series, only received within the last few weeks, consisted of 16 specimens from Johore, opposite Singapore Island. Dr. Hanitsch wrote March 28, 1917 : " My collector was over there last week, and this is the result of five days' collecting ! As soon as I have the opportunity I will try to send you more. Johore Bahru, where the specimens were taken, is the capital of Johore, close to the straits separating Singapore Island from the mainland. 'Bahru' means 'new.' " The specimens were noted as having been captured four miles from Johore Bahru on the following dates :—

* A few days after the meeting on June 6 I received the following note from Mr. W. Feather, F.E.S., at Kibwezi, B.E. Africa :—" On September 26, 1916, about 7.30 a.m., I saw a green Bee-eater [probably *Merops* sp.] catch and eat a *Belenois mesentina* ♂. The insect was at rest on a low bush, and I had gone quite close to examine it and had disturbed it."—E. B. P.

March 22.—2 mimetic females (*polytes*).
,, 23.—1 male-like female (*cyrus*), 4 males.
,, 24.—3 males.
,, 25.—1 mimetic female (*polytes*), 3 males.
,, 26.—2 males.

The numbers were quite insufficient to warrant any conclusion, but they suggested the possibility that the *cyrus* females were rarer on the mainland than on the island. Prof. Poulton very much hoped that Dr. Hanitsch would be able to send a series sufficiently long to test this suggestion thoroughly.

Papilio polytes romulus, Cr., at Singapore.

Captures in 1916.	Non-mimetic male.	*Cyrus*, Hübn., ♀, male-like.	*Polytes*, L., ♀, mimetic.
May 12 . . .	7		
October . . .	1		1
Nov. 15 . . .	1	1	1
,, 16 . . .	3		1
,, 17 . . .	2		1
,, 22 . . .	2		1
,, 23 . . .	2	1	
,, 25 . . .	2		1
,, 27 . . .	3	1	1*
Dec. 2 . . .			1
,, 4 . . .	5		1
,, 5 . . .	3		
,, 6 . . .	3	2	
Totals	34	5	9

* The form *stichius* with no white in the hind-wing cell.

Prof. Poulton said that variation in the submarginal red spots and in the white patch and the adjacent red markings on the hind-wing of the mimetic *polytes* female made it a favourable example for the study of the hereditary transmission of very small characters and for testing whether such transmission was Mendelian. With this object he had analysed Dr. Hanitsch's material and the result showed that there were numbers of small characters which might be selected for breeding experiments.

Considering first the 9 females captured Oct.–Dec., 1916, there was great variation in the size of the white patch in the hind-wing, but it was generally large and well developed in all its parts, viz. the mark in the cell and those in the four areas from 2 to 5. The white marking in area 2 was always more or less replaced by red and that in area 5 very variable in size. The white marking in the cell was usually large, but very small in the female captured Dec. 4, and absent from that captured Nov. 27, so that this latter specimen belonged to the form *stichius*, Hübn., the first that had appeared among the specimens sent by Dr. Hanitsch from Singapore. The female of Dec. 2 combined a large white marking in the cell with a mere trace in area 5 and a small remnant near the cell, all the rest being replaced by red, in area 2. The white marks in areas 3 and 4 of this specimen were of moderate size, the outer end of the former being capped by a red marking half as long as the white. This red section did not here appear to *replace* the white, but to be added to it, for there was no gradual transition as in area 2, but both white and red sections ended abruptly and were separated by a trace of ground-colour, in the form of a thin curved black line. The independent variation of the elements of the white patch was very evident, especially that in the cell as compared with those in areas 2–5. Thus, when the females were arranged according to the size of the mark in the cell, from its largest down to its disappearance in the *stichius* form, the sizes of the marks in the areas outside the cell by no means followed the same arrangement; for they remained of full size even in the *stichius* form.

The combination of small submarginal red spots above with large ones below, as noted in some of Dr. Hanitsch's Singapore specimens of January and February, 1916 (Proc. Ent. Soc., 1916, p. lxxvii), was here seen in the captures of Nov. 25 and Nov. 27 (the *stichius* form), and to a less marked extent in those of Nov. 17 and Nov. 22. The especially small size of the submarginal red spot in area 3 (Proc. Ent. Soc., 1914, p. xxv) was very evident in these four specimens. It was altogether wanting from the upper surface of the *stichius* form and represented by a mere trace in the specimen of Nov. 25.

Comparing these nine *polytes* females with eight out of the nine (one had been mislaid) taken Jan.–May, 1916, the latter series showed a somewhat higher average development of the white markings on the hind-wing. The mark in the cell was in no case reduced so far as in two of the later captures, and the mark in area 2 was nearly replaced by red in only one specimen, also characterised by a smallish white mark in area 5—well developed in the seven others.

As regards the three *polytes* females from the mainland, one of the two taken March 22, 1917, much resembled the island one of Dec. 2, 1916, although as compared with the latter the white mark in the cell was much smaller while the spot in area 5, though very small, was larger and far more distinct. These two specimens of Dec. 2 and March 22 might indicate a transition towards the *romulus* ♀ form, mimicking *P. hector*, L., a transition especially suggested by the increasing red and diminishing white in area 2, the addition of red to area 3, and in the tendency of the red to encircle the white patch by invading the basal border of the mark in the cell. This invasion was especially marked in the mainland female and in the island one of Nov. 25, in both of which the red scales were continued across the cell into area 5. The other mainland female of March 22 showed a small spot in area 5, but the white markings were otherwise fairly developed, as they were in the female of March 25, with a much larger spot in area 5.

When Dr. Hanitsch's mimetic female *polytes* were last shown to the Society (Proc., 1916, p. lxxvi) Mr. J. C. F. Fryer and Mr. E. E. Green remarked on the difference between the inner marginal border of their hind-wing pattern and that of Ceylon specimens. The latter seemed to them to show a smaller development of the red markings in this region. Prof. Poulton had since carefully compared the specimens and found that the difference in appearance was due to two out of the three red markings in area 1*c* of the western females being fused in the eastern females into a single long basally placed streak, the outermost marking remaining separate in both localities. The basal division into 2 separate markings was sometimes indicated by a notch which occasionally (for example in 2 Singapore females taken in January, 1916) broke through, producing a pattern like that found in the great majority of the *polytes* females in Ceylon. Among these latter too the same fusion into a single notched streak occasionally took place. So far as could be inferred from the insufficient material in the Hope Department specimens from the mainland of India were intermediate in this respect between those from Ceylon and Singapore. It would be very interesting to breed from the exceptional females in both east and west.

Predaceous Reduviid bugs and Fossors, with their prey, from the S. Paulo district of South-East Brazil.—Prof. Poulton exhibited and described a set of predaceous insects captured 1913–16 by Dr. Gregorio Bondar in the S. Paulo district of S.E. Brazil, and presented to the Hope Department by Mr. G. A. J. Rothney. In determining the species kind help had been received from Mr. C. J. Gahan, Mr. W. L. Distant, Mr. K. G. Blair, Mr. R. South, Mr. A. S. Hirst, and especially from Dr. G. A. K. Marshall and Mr. Rowland E. Turner; in interpreting the often indistinctly written Portuguese on some of the labels, kind help had been given by Don Fernando de Arteaga. The great majority of the observations had been made at Piracicaba, about 100 miles N.W. of S. Paulo, in S.E. Brazil; others at Campinas, about 70 miles N.W. of the same city.

The Reduviid captors and their prey—almost invariably insects belonging to the specially protected groups—were shown in the following table :—

SPECIES OF REDUVIID BUG.	SPECIES OF PREY.	LOCALITY AND DATE.
Apiomerus lanipes, F.	The Fossor (Sand-wasp) *Pepsis* sp. ♂.	Piracicaba, Jan. 12, 1914.
,, ,,	The Honey-bee *Apis mellifica*, L., ☿.	,, ,, 1913–1916.
,, ,,	The Anthribid beetle *Stenocerus fulvitarsis*, Germ.	,, ,,
Apiomerus sp. nr. *lanipes*, F.	The Cantharid beetle *Epicauta nigropunctata*, Blanch.	,, ,,
Zelus sp. A.	The Honey-bee *Apis mellifica*, L.	,, ,,
,, B.	*Bracon* sp. ♀.	,, ,, 1913, Oct. 2 or Nov. 2
Heniartes annulatus, H. S.	The Homopteron (*Jassidae*, *Tettigoniellinae*), *Teletusa* sp. nearest *peruviensis*, Dist.	,, ,, 1913–1916

The Fossors and their prey were recorded in the following table, the notes being taken from the French and Portuguese of the labels on the specimens or from the common labels written by the collector and pinned beneath two or more specimens. "Nid" had been taken to mean burrow, inasmuch as the species belonged to the groups which were well known to dig in the ground. Dr. R. C. L. Perkins had furthermore kindly examined the specimens and was sure, from their structure, that all except one were fossorial in habits. The one for which this evidence was not clear was the *Podium*, which on other grounds, viz. its prey, consisting of several cockroaches, was also sure to be fossorial. When there is no reference to the burrow it is to be inferred that the prey was being carried or dragged by its captor. In most cases it was stated on the label that the Fossor had been captured with its prey.

SPECIES OF FOSSOR.	SPECIES OF PREY.	LOCALITY AND DATE.
PSAMMOCHARIDAE (POMPILIDAE). *Pepsis* sp.	A Trap-door spider (*Ctenizidae*), *Idiops* sp.	Piracicaba, Dec. 23, 1914.
Cryptocheilus (*Salius*) sp. A., unnamed in Brit. Mus., 2 examples.	*Lycosa* sp., 2 examples.	,, ,, Jan. 27 and Dec. 4, 1914.
Parapompilus erubescens, Tasch.	,,	,, ,, March 25, 1914.
Psammochares, sp.	,,	,, ,, Jan. 27, 1914.
Episyron sp.	A web-building spider *Araneus* (*Epeira*) sp.	,, ,, Oct. 6, 1915.
SPHEGIDAE. *Podium* sp. captured in its burrow.	1 *Epilampra conferta*, Walk., out of several *Blattidae* of same species in the burrow.	,, ,, Oct. 5, 1914.
Ammophila sp.	Note: "Chasse larve de Lépidoptères Géometrides." Another label adds in Portuguese that the larvae were green. No specimens.	No data but certainly in S. Paulo district, and between 1913 and 1916.
Sphex ichneumoneus, L., captured in its burrow.	1 ♀ nr. genus *Heteromallus*, out of several *Locustidae* in the burrow.	Piracicaba, Nov. 7, 1913.
,, ,,	2 ♀, 1 immature Locustids, *Conocephaloides* sp., probably *maxillosus*, F., in the burrow.	,, ,, Jan. 13, 1914.
,, ,,	2 ♀ Locustids, one *Conocephalus* sp., the other ? genus, in burrow.	,, ,, Jan. 26, 1915.
Sphex nitidiventris, Spin., captured in its burrow.	2 *Subria* sp. ♀ out of several *Locustidae* in the burrow.	No locality, but certainly S. Paulo district, probably Piracicaba, as G. Bondar was there Jan. 13 and 27. Jan. 23, 1914.

SPECIES OF FOSSOR.	SPECIES OF PREY.	LOCALITY AND DATE.
Sphex striatus, Sm.	The Acridian (grasshopper) *Osmilia violacea*, Thunb., ♀.	In campo, Campinas, Dec. 7, 1913.
,, ,,	The Acridian *Schistocerca flavofasciata*, de G., ♀. The prey is buried near the place where it was captured—one Acridian for each *Sphex* larva.	In the cemetery, Campinas. Dec. 8, 1913.
,, ,,	*Schistocerca flavofasciata*, ♂.	Piracicaba, Jan. 22, 1915.
Sphex sumptuosus, Costa, captured in its burrow.	2 ♂, 1 ♀ of the Locustid *Anisoptera fasciata*, de G., in the burrow.	In the cemetery, Campinas, Dec. 21, 1913.
Cerceris imitator, Sm., 4 examples. A note on one states that it was captured in its burrow where it collects many "Chrysomelidae."	8 of the Eumolpid beetle *Colaspoides* sp., probably new, taken in burrow with one *Cerceris*, 7 in another with a second *Cerceris*.	Campinas, Dec. 21, 1913.
Cerceris simplex, Sm., subsp., 2 examples captured in burrows "deep in the earth" (Portuguese).	1 Tenebrionid beetle *Epitragus* sp., taken in one of the burrows.	,, ,, Dec. 21, 1913.
Astata sp., captured on a plant.	An immature Pentatomid bug.	Piracicaba, Jan. 18, 1916.
Notogonia decorata, Sm.	A ♀ Achetid of genus *Gryllus* or *Gryllodes*.	Piracicaba, April 1915.
Notogonia sp. A., 2 examples.	2 ♂ Achetids as above, one with each Fossor.	,, ,,
Tachytes callosa, Kohl., 2 examples. "They live in sandy" places on one in Portuguese.	Note: "Chasse des petits mouches" on one Fossor. No specimens of prey.	On the football ground, Campinas. This note and date on one specimen, but probably applies to both, Dec. 19, 1913.
Tachytes sp.	A ♂ Acridian ? gen. et sp.	Campinas, Dec. 19, 1913.

SPECIES OF FOSSOR.	SPECIES OF PREY.	LOCALITY AND DATE.
Monedula (*Stictia*) *adonis*, Handl., 2 examples. "Chasse Microlépidoptères" on common label.	The arrangement of collection showed 3 *Hesperidae* (probably *Gorgythion begga*, Prittw., *Staphylus epicaste*, Mab., ♀, *Staphylus* sp. ? *minor*, Schaus), associated with one *M. adonis* and 3 others (probably *Staphylus* sp. ? *scoramus*, Schaus, ? *Megistias* sp., ? *Systasea* sp. ♀), with the other—almost certainly taken from the burrows.	No locality. Probably Piracicaba as Jan. 23, 1914, was on the common label (cf. *Sphex nitidiventris*, p. xxxvi).
Monedula (*Stictia*) *gravida*, Handl., 2 examples. "Chasse Diptères" on common label.	4 *Volucella obesa*, F., probably taken from burrow of one or both Fossors.	Piracicaba, Oct. 1914.
Monedula (*Stictia*) *surinamensis*, de G.	Note: "Chasse divers Diptères." No specimens.	No data, certainly 1913–1916, S. Paulo district.
Bembidula variegata, Oliv. Probably from burrow. "Chasse larve de punaises de bois."	4 immature Pentatomids, almost certainly from burrow.	,, ,,

It was of great interest to have the opportunity of studying a good series of S. American Fossors and their prey, and to recognise how constant were the instincts hitherto recorded mainly from other parts of the world. Thus all the *Pompilidae* had taken spiders, all the species of *Sphex* Orthoptera, the *Cerceris* a beetle, the *Astata* a bug, etc. The orthopterous prey of the *Podium* suggested the possibility that its true position lay between *Ammophila* and *Sphex*. The most interesting record was that of *Monedula adonis*, one of the Bembecides, with Hesperid prey, not unnaturally classed as "Microlepidoptera" by the collector. The specimens were in very bad condition and so could not be determined with certainty, but there was no doubt about the fact that very different species were represented. Only three retained their bodies, and of these Dr. Eltringham had made out two to be females and one a male. Although so different, the general appearance of the species was similar, all being dark brown in colour with no pattern or one so inconspicuous as to be invisible at a little distance. It seemed probable that the Fossors had caught their prey drinking at mud and had selected females as far as possible. Dr. Carpenter's observation, recorded on p. xlii, supported these suggestions.

Mr. G. A. J. Rothney had written Oct. 19, 1916 :—

" The *Fossor* that stores Skippers is new to me but I have met cases of a first stage in that direction. *Vespa cincta*, F., the common Indian Hornet, captures Skippers on the wing, strips off the two wings on one side, then holds the other two and squeezes the body dry, drops the body and two wings and flies away. I have recorded the incident in the Entom. Mo. Mag., vol. xiii, 1876–7, pp. 254–5, under 'Squirrel versus Hornet.' I expect Fossors and Wasps have a taste for the fat juicy bodies of Skippers, and as they fly by day they fall a natural prey; but the storing is a distinct advance. The habit of *V. cincta* is undoubtedly established, not a chance occurrence. The *favourite* Skipper was a thick-set fleshy one—dull in colour like our *tages*—but with long, pointed wings. There was a prompt, business-like action about the operation which told it was an old game or, as they would say in India, Shikár."

The only previous observation of the storing of butterflies by wasps was, so far as Prof. Poulton knew, that recorded by Belt in " The Naturalist in Nicaragua " (2nd edition, 1888, p. 109) :—

" There is . . . a yellow and black banded wasp that catches them [' *Heliconidae*,' evidently referring to the transparent-winged *Ithomiinae*] to store his nest with; and whenever one of these came about, they would rise fluttering in the air, where they were safe, as I never saw the wasp attack them on the wing. It would hawk round the groups of shrubs, trying to pounce on one unawares; but their natural dread of this foe made it rather difficult to do so. When it did catch one, it would quietly bite off its wings, roll it up into a ball, and fly off with it." The description suggested a Diplopterous rather than a Fossorial wasp.

In addition to the specimens here tabulated Dr. Bondar's collection exhibited to the meeting contained the tube of a trap-door spider together with the probable owner—a spider of the genus *Idiops* without label, but placed in close proximity to the tube. To the latter was attached a Portuguese label of which the translation was " Destroyed by wasp. Seems to be a *Salius* with yellow-tipped antennae, of medium size." The date was Jan. 15, the year being left uncertain. It was probable that the wasp referred to was the *Pepsis*, taken with a spider of the genus *Idiops*, Dec. 23, 1914, and standing first in the table on p. xxxvi. This Fossor was of moderate size and had yellow-tipped antennae. It was also probable that the spider had been attacked and stored in its own tube by the Fossor, which was thus saved the trouble of digging a burrow for itself—an example on a larger scale of the tragedy described by W. H. Hudson in "The Naturalist in La Plata" (pp. 180-82 of the 1895 edition) :—

" On the grassy pampas, dry bare spots of soil are resorted to by a class of spiders that either make or take little holes in the ground to reside in. . . .

" . . . Now, in summer, to a dry spot of ground like this, comes a small wasp, scarcely longer than a blue-bottle fly, body and wings of a deep shining purplish blue colour, with only a white mark like a collar on the thorax. . . . It visits and explores every crack and hole in the ground, and, if you watch it attentively, you will at length see it, on arriving at a hole, give a little start backwards. It knows that a spider lies concealed within. Presently . . . it disappears into the hole and remains there for some time. Then, just when you are beginning to think that the little blue explorer has been trapped, out it rushes, flying in terror, apparently, from the spider who issues close behind in hot pursuit; but, before they are three inches away from the hole, quick as lightning the wasp turns on its follower, and the two become locked together in a deadly embrace. Looking like one insect, they spin rapidly round for a few moments, then up springs the wasp—victorious. The wretched victim is not dead; its legs move a little, but its soft body is paralysed, and lies collapsed, flabby, and powerless. . . . When the wasp has sufficiently rested after the struggle, it deliberately drags the disabled spider back into its own hole, and, having packed it away at the extremity, lays an egg alongside of it, then, coming out again, gathers dust and rubbish with which it fills up and obliterates the hole. . . ."

OBSERVATIONS ON FOSSORS IN EAST AFRICA BY DR. G. D. H. CARPENTER.—Prof. POULTON said that an observation recorded in a letter written to him Jan. 18, 1917, by Dr. Carpenter, threw further light on the storing of *Hesperidae* by *Bembecides* :—

"Yesterday (on a journey from Ndala, 33° 15′ E., 4° 45′ S., to my new post *Igalula*, on the Central Railway, about 40 miles E. of Tabora) I had such an interesting observation of a *Bembex* that I write post haste to tell you. I was catching Skippers on mud on the road (and had got several of a beautiful species, bright golden brown, with the hind-wing below marked with a number of whitish radiating streaks [*Oxypalpus harona*, Westw., = *ruso*, Mab.]. This I had never seen before; also a large and wonderful white species [*Leucochitonea hindei*, H. H. Druce] which I took at first for a small *Belenois*, among which it was drinking. These will come by the next box. To return to our muttons) and suddenly saw an unmistakable *Bembex* flying round my legs, on which sat, and bit, numbers of *G. morsitans*, *Tabanus*, and *Haematopota* (indeed, I had been bitten so much that I was quite jumpy !). I naturally thought the *Bembex* was after these, though she was not of the species that I have often seen come round me looking for fat *Glossina* or *Tabanus*. She was large, greenish yellow, with a transverse black band across each abdominal segment. After buzzing around for a bit (the hum was the characteristic *Bembex* hum, which is of a tone different from that of other Hymenoptera, or *Asilidae*, whose buzz is equally characteristic) she hung in the air a few inches above a Lycaenid, quietly drinking on the mud, and pounced on it. I couldn't see *exactly* what happened, but the Lycaenid was dropped, and the *Bembex* moved away to where a Skipper was also drinking, and hung poised over that for a second or so—evidently examining it closely. The result seemed unsatisfactory; she moved away and hung over another, then, *pounce*, and she'd got it! For a brief moment she remained in the air, hovering just over the ground, holding the Skipper. I struck but, oh, I missed her! and she was off like a streak of lightning. I did not see her again. I waited a little (as long as I dared, for the afternoon thunderstorm was coming up) but she did not come back; so once again I have sent you a new Fossor observation, without the specimen! It was interesting that she should catch a Lycaenid and drop it; I was so interested watching *her* that I could not devote any attention to the discarded prey. I expect the reason she did not take the *first* Skipper was that it was not fat enough. My observations on the *Bembex* that preyed on *Glossina* on Nsadzi Island (see my first Sleeping Sickness Report) showed that the prey was the fattest that could be selected—often a pregnant ♀ fly. So the rejected Skipper may have been a ♂ and the chosen a ♀; it was a dark brown species with narrow wings, hind-wing beneath with a row of tiny white dots (I don't know the generic name). Has a *Bembex* ever been known to prey on Skippers or on any other butterfly? *Don't* say it was an Asilid, for it was *not!* I could tell an Asilid from a *Bembex* with my eyes shut by the buzz alone! Moreover, I have yet to meet the Asilid that takes its prey sitting. Also the broad abdomen—without pedicel—rendered it unlikely that she was not a *Bembex* but some other kind of predatory (perhaps Diplopterous) wasp. I should much like to know if there are any other notes of this kind."

The following observations on *Ammophila beninensis*, Pal. de Beauv., or a species very close to it, were recorded in a letter written by Dr. Carpenter, Jan. 14, 1917, from Ndala, which appears on the map as a Mission Station:—

"On Jan. 3rd I disturbed from her work, on the road, a fine Sphegid. On the wing her long legs were bunched together, hanging down very conspicuously. Her prey, a large, smooth, brown Noctuid larva, lay in a slightly curved posture at the brink of a vertical burrow. I sat down beside it, and when the *Sphex* had returned and, as I did not move, recommenced her work, I was able to follow closely. She examined the larva very carefully from head to tail, and then went down the hole and brought up an 'armful' of soil, held by the fore limbs up against her 'chin.' She walked away with this, and deposited it about 3 inches away, giving, at the exact moment when she put it down, a short sharp buzz. This was repeated once or twice, and then, having placed the tip of her abdomen at the orifice of the burrow, she felt her way down backwards, and before she disappeared seized the larva just behind the head by her mandibles and drew it down after her. But the chamber at the bottom was not big enough, so with loud buzzing she pushed her way past the larva and came out again; then, standing over the hole, she put her head down and seized the larva as far in front of its hinder extremity as she could reach, and dragged it up to the surface. The next step was to grip, between her fore-legs, the extreme end of the larva, and to shift her mandibles so as to get a fresh hold further forward; thus she lifted it again, and in this way dragged it right out of the hole and laid it at the brink, the concavity of its posture directed towards the hole, the two extremities at the very edge. She then went down again and brought up another armful of earth, depositing it in the manner previously described. Having done this several times she again went down backwards, precisely as before, and dragged her victim down by its 'neck.' But again the chamber at the bottom of the burrow could not contain this large larva, and its hinder end projected up into the burrow. So once more the unskilful wasp had to push her way out with loud buzzings, and drag the larva out again in the same way, and further enlarge the chamber. Still it did not prove big enough, and this all happened *four* more times! On the sixth occasion, the larva not having been disposed quite exactly in the right position at the mouth of the hole, when she backed down she caught hold of the *posterior* and not the anterior end. The larva then moved very feebly (it had had a *lot* of pulling about!) and the wasp at once perceived that something was wrong. She hurried out of the hole and examined it very carefully. She then adjusted it to the proper position, went down again, and dragged the larva down by the 'neck' as usual. But still it could not be wholly contained in the chamber, and had to be dragged out once more for further digging: this time, however, a new difficulty arose; it was so far down that the *Sphex*, standing over the hole, could only grasp the extreme tip of its body (posterior end), so that when she drew it up there was nowhere for the fore limbs to grip! Thus, every time she tried, the larva fell down to the bottom of the hole again, and she began to get very agitated.

"At last, after *ten* efforts she managed somehow to get a grip with the forelegs, and so pulled the larva out as at first described, enlarged the chamber once more, and pulled the larva down for the seventh—and last—time; for now it fitted wholly in the chamber and none of it was visible when one looked down the burrow. After a pause—quite remarkably short—for oviposition, the wasp came out and proceeded to fill up the hole in the usual way, by biting off small lumps of soil, putting them down and ramming them in with her head, but making very little use of the method of scratching loose earth backwards. When she had all but finished I caught her (and send her to you for naming), finishing off the burrow myself lest her progeny should suffer! (But I did *not* bite off small lumps of soil and ram them down with my head.)

"There are one or two points worth remarking:—

"1. Repeated efforts to get a large larva into a chamber too small for it. This seems to imply that the wasp digs a chamber of orthodox size, and finds larvae *afterwards*. Does she use larvae of varying size, or was she inexperienced?

"2. The larva must be dragged down by the anterior extremity. One sees no reason why this is necessary.

"3. On the whole the wasp works quietly. The prolonged, high-pitched, penetrating, buzz which *S. marginatus* makes the whole time she is burrowing, so that one often hears her at work long before one sees her, is replaced in this species by a short buzz when the armful of earth is put down. Also, when she had to push her way out past the larva in the too small burrow she gave a buzz which one could easily imagine to express vexation!"

Mr. E. E. Green observed that in Ceylon a large Reduviid bug feeds on a still larger milliped.

Mr. Talbot observed that in his garden he had noticed that fly-catchers paid no attention whatever to butterflies.

Dr. Chapman also commented.

Letter from a Fellow interned in Germany.

The Secretary read the following interesting letter from Mr. E. M. Dadd, F.E.S. :—

"Dear Sir,

"The writer, as you are no doubt aware, has been a Fellow of the Society for many years past. As a resident in Germany at the outbreak of the war he shared the lot of his fellow countrymen, and has now been interned at Ruhleben since Nov. 6, 1914.

"In the meantime those amongst us interested in Natural Science have formed a Natural History Society, and weekly meetings are held, papers read, and furthermore a regular course of Lectures in Natural History, Biology and Botany established under the direction of Dr. Lechmere. The writer, as the sole representative of Entomology, has also given several lectures on various entomological subjects. In the meantime we have established as well-organised a Biological Laboratory as could be expected under the circumstances, with microscopes, and are extending the same as far as possible. It is proposed this year to form a small section for the study of entomology, and space has been placed at my disposal for research work.

"I have been able to get in a certain amount of my own material and a certain amount of literature, but this hardly suffices. Might I therefore appeal to the Society for assistance in the way of books or magazines and more especially in the form of duplicate insects (butterflies in papers), beetles, hymenoptera, etc. If desired the books could be returned later on.

*　*　*　*　*

"Trusting to meet with a favourable response, and with kind regards and best wishes to all friends,

"I remain yours very sincerely,

"Edward M. Dadd."

Paper.

The following paper was read :—

" On a collection of Lepidoptera made in East Africa by Mr. W. A. Lamborn, F.E.S.," by H. ELTRINGHAM, M.A., D.Sc., F.E.S.

Wednesday, October 3rd, 1917.

Dr. T. A. CHAPMAN, M.D., F.Z.S., Vice-President, in the Chair.

Election of a Fellow.

Dr. GEORGE GRANVILLE BUCKLEY, M.D., F.S.A., Holly Bank, Manchester Road, Bury, Lancs., was elected a Fellow of the Society.

Death of an Honorary Fellow.

The death of Dr. EMIL FREY-GESSNER was announced, and a vote of condolence with his daughter was passed.

Exhibitions.

COLEOPTERA ON UNUSUAL FOOD-PLANTS, ETC.—Mr. DONISTHORPE exhibited the following Coleoptera :—

1. *Miarus campanulae*, L., taken on the Downs at Findon (Sussex), June 14, 1917. It occurred in some numbers, but only in a small species of buttercup, of which a specimen was exhibited. It has only been recorded heretofore in flowers of *Campanula* and *Phyteuma*. A small black Chrysomelid larva, about the size of the *Miarus*, also occurred in the buttercups, and they were superficially very like each other.

2. *Lycoperdina succincta*, L., taken at Barton Mills (Suffolk), Sept. 9, 1917, in fungus. This species was first discovered to be British in October last year by Dr. Nicholson, who took a series in ripe *Lycoperdon gemmatum*. Mr. Donisthorpe was evidently a little early for the beetle, as his specimen was slightly immature, and he did not find any more, but he took about a dozen larvae in a fresh *Lycoperdon gemmatum*, which he is trying to breed.

3. *Cassida fastuosa*, Schall. Taken at Goring Woods

PLATE B.

LARVAE OF SAWFLIES.

1. *Cimbex lutea*, L. Coiled under a Sallow-leaf.
2. *Abia fasciata*, Leach. Coiled under a Snowberry-leaf.
3. *Trichiocampus viminalis*, Fall.

(1 and 2 were photographed from living specimens on their actual food-plants. 3 is from the inflated skin of a larva found on Poplar in the grounds of the Natural History Museum, S.W.)

PLATE C.

LARVAE OF SAWFLIES.

1. *Eriocampa ovata*, L. On Alder, covered with a mealy white secretion.
2. *Pteronidea salicis*, L. On long-leaved Willow. (The colour of the body is blue-green in the middle, pale salmon colour at each end.)
3. *Nematus* (*Croesus*) *septentrionalis*, L. On Birch. The insect is rising into its "threatening attitude," and has exserted its ventral "scent-glands."
4. *Lygaeonematus crassicornis*, F. On Poplar, surrounded by its "stockade" of inspissated secretion formed into little white pillars.
5. One of the pillars ($\times$ 40 diameters).

1

2

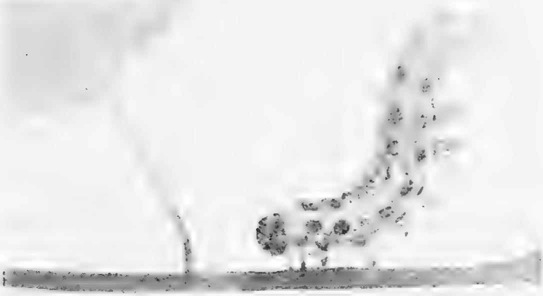
3

F. D. Morice, Photo. *Half-Tone Eng. Co. Ltd.*

LARVÆ OF SAWFLIES.


1


2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5

F. D. Morice, Photo. *Half-Tone Eng. Co. Ltd.*

LARVÆ OF SAWFLIES.

(Sussex), July 28, 1917, on *Inula dysenterica* (Fleabane). This is its first record on Fleabane, and all the specimens were of a bright yellow and black colour when alive, and not, as is usual, red and black. Though freshly emerged they were quite mature, and moreover were kept alive for a long time without changing colour in any way. A specimen from Box Hill of the typical form, taken on *Inula conyza* (Ploughman's Spikenard), May 7, 1909, was also exhibited for comparison. It was previously only recorded from *Senecio jacobae* (Ragwort).

PHOTOGRAPHS OF SAWFLY LARVAE.—The Rev. F. D. MORICE exhibited with the Epidiascope a set of photographs (mostly taken from living specimens feeding or resting on their usual food-plants) of the following Sawfly larvae :—

Cimbex lutea, L., coiled up on Sallow, *Abia fasciata*, L., do. on Snowberry, *Phymatocera aterrima*, Kl., on Solomon's Seal, *Rhadinoceraea micans*, Kl., on Iris, *Empria* (*Poecilosoma*) *luteola*, Kl., on Yellow Loosestrife, *Eriocampa ovata*, L., on Alder, *Nematus* (*Croesus*) *septentrionalis*, L., in "threatening attitude" on Birch, *Pteronidea* (*Nematus*) *salicis*, L., on Birch, *Trichiocampus viminalis*, Fall., on Poplar. Also of a cast skin, showing the Y-shaped spines, of a *Periclista* larva—probably *melanocephala*, F.; and of the sort of "palisade" —a ring of little columns formed by the rapid drying of some bubbly, froth-like secretion from the mouth—with which the young larva of *Lygaeonematus compressicornis*, F., surrounds itself while feeding on a leaf of black Poplar. (Plates B and C.)

The CHAIRMAN observed that Sawfly larvae in moulting attach themselves by the tail to a gummy substance previously deposited by them, because they have no hooks on the terminal pad of the prolegs such as occur in the Lepidoptera; the true legs, which in the latter are generally used rather as hands than as feet, are in the Sawflies provided with claws sharp enough to penetrate the leaf.

Paper.

The following paper was read :—

"Further notes on Recapitulatory Attitudes in Lepidoptera," by T. A. CHAPMAN, M.D., F.Z.S.

Wednesday, October 17th, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Election of Fellows.

Mr. John Williams Hockin, Castle Street, Launceston, Cornwall; Col. Turenne Jermyn, Highcliffe, Weston-super-Mare; Mr. Arthur Wallace Pickard-Cambridge, M.A., Balliol College, Oxford; and the Rev. Prebendary A. P. Wickham, East Brent Vicarage, Highbridge, Somerset, were elected Fellows of the Society.

Exhibitions.

Hyper-parasites on Apanteles glomeratus. — Mr. Donisthorpe exhibited a number of small yellow cocoons which were taken on a fence at Putney on Sept. 15th last, and which had emerged from the body of a White Butterfly larva. These cocoons, belonging to a parasite on the larva of this butterfly, are of course common everywhere just now where the butterfly has occurred. He stated that he had found the cocoons just after they had emerged from the larva to which they were attached, the latter being still alive, and he observed two (or three ?) small Hymenopterous insects hovering about the cocoons. One of these was secured, and the larva and cocoons were taken home in a glass-topped box. On October 8th Hymenopterous insects began to emerge from the cocoons and were still doing so. Of the 30 specimens exhibited, some of which were alive, 28 belonged to the insect captured on Sept. 15th, an Ichneumon, and 2 (a ♂ and ♀) to another species of Hymenoptera, also an Ichneumon. It would seem certain that these two species are hyper-parasites, parasitic on the parasite of the butterfly larva. The questions arose if the cocoons had not been disturbed, would they all have produced the hyper-parasites ? and is it necessary for the latter to seek out the cocoons just after they have emerged from the original host's body ?

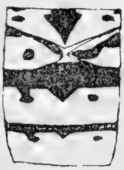
A new Sub-species of Morpho rhetenor.—Mr. Dicksee exhibited a probable new sub-species of *Morpho rhetenor*, and gave the following description :—

" This sub-species, now received for the first time from Colombia, differs from the two other sub-species, *cacica* from Peru and *eusebes* from the Amazons, in having a complete row of twelve white submarginal spots on each side of the upper surface, six on each wing, instead of from three to five on each front wing only. It has also a very small white spot beyond the cell on the front wing, and the small white crescents between each nervure on the margins are more distinct. On the under side the ground colour is lighter, making all the markings stand out more distinctly. Locality Rio Guatiquia, April 1917."

An aberrant Wasp.—Dr. Chapman exhibited an aberrant specimen of a wasp (*Vespa germanica*), and made the following observations :—

" Wasps rarely come into my sanctum, but on Oct. 6th one came and seemed very interested in some preparation I was working at, so that I easily noticed that there was something unusual about some abdominal segments. The insect is the one exhibited. The second abdominal segment (counting in the usual incorrect manner) is wanting in the middle dorsal line, and the two sides nearly meet each other, tapering from a nearly normal width laterally to almost a point where they are opposed, and where continuity is maintained by membrane ; the markings on the two sides are not symmetrical.

" The first (basal, really 2nd abdominal) segment is produced mid-dorsally at its hinder margin, so as to form an angular projection, largely compensating for the defect of the following segment.



Sketch of teratological specimen of *Vespa germanica* ☿, × about 4.

" I add a rough outline of the aberrant portion of the specimen. How did such a defect come about ? It might be the result of an injury at a late larval stage, but it is very unlikely for a wasp grub, protected in its cell in the nest as it is, to receive such an injury. It rather more strongly suggests a congenital defect in the closing of the umbilical opening. It is not easy to say whether the want of symmetry in the peccant segment supports this view or the contrary. I will hand the specimen to the British Museum."

A very rare British Beetle.—Mr. O. E. Janson exhibited a fine example of *Tapinotus sellatus*, Fab., taken by him on June 9th last near Horning, Norfolk, and recorded in the October number of the Ent. Mo. Mag. Only two British specimens were previously known, these having been taken in the years 1838 and 1846. He also showed some other Coleoptera of interest taken in the same locality.

A British specimen of Notodonta bicoloria.—Mr. O. E. Janson also exhibited on behalf of Mr. L. H. Bonaparte-Wyse, who was present as a visitor, a fine male specimen of *Notodonta bicoloria*, Schiff., taken by him near Killarney on June 7th last, and recorded in the "Irish Naturalist" for October.

Living Dermestid Larvae.—Mr. Green exhibited living larvae of a Dermestid beetle, *Tiresias serra*, found under dead bark of an oak tree, in the neighbourhood of Shrewsbury. The larvae have the abdominal segments clothed with erect rufous hair. There is also a loose caudal tuft of long greyish hairs, which is vibrated rapidly when the insect is annoyed or disturbed.

Mr. Main and Mr. Donisthorpe commented, the latter observing that judging from his experience of the larva in observation ants' nests, the vibration had apparently a protective value.

Mr. Green also read the following note on the oviposition of the sawfly *Pteronus sertifer*.

" The method of oviposition of the sawfly *Pteronus sertifer* has been a subject of discussion at several of our meetings during the present year. Insects raised in captivity, by Mr. Morice and myself, have refused to throw any light on the question. I have now been successful in obtaining eggs from a wild female. The parent was captured on the 1st of this month, and confined in a glass tube with a sprig of pine foliage. The contents of the tube were examined, each day, for the first week, without result. The insect remained alive but, apparently, uninterested in the question of reproduction. The tube was put aside and (it must be confessed) completely forgotten—until this morning, when the insect was seen to be dead, with its saws choked with a mass of what appears to be fragments of plant fibre and cell tissue. An examination of the pine foliage showed some semitranslucent paler areas along the edges of the needles. A rough dissection proved that these pale areas each contained a single creamy-white egg. At the tip of one needle, an egg was partly exposed; but in every other case the eggs are completely concealed and their presence indicated solely by the translucent areas. There is no noticeable disturbance of the tissues, nor is there any extraneous deposit of fibrous or secretionary matter—such as has been observed above the embedded eggs of *P. pini*. The egg capsule is very thin and fragile, and is easily ruptured. It should be noted that the above remarks are the result of a very hurried and superficial examination, undertaken just before coming up to attend this meeting."

Wednesday, November 7th, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, and afterwards Dr. G. B. Longstaff, M.A., M.D., Vice-President, in the Chair.

Election of Fellows.

Prof. T. D. A. Cockerell, of the University of Colorado, U.S.A., Miss D. J. Jackson, Swordale, Evanton, Ross-shire, and Mr. Jesse Johnson, 16 and 17 Marston Road, Stafford, were elected Fellows of the Society.

Exhibitions.

Nuptial Flight of Butterflies.—Dr. F. A. Dixey exhibited several pairs of Pierines captured by Dr. G. D. H. Carpenter, at Itigi, 150 miles east of Tabora in what was German East Africa. In commenting on them, he said—

" Professor Poulton has put into my hands the following extracts from two letters written by Dr. Carpenter and dated respectively on August 22 and 31 of the present year.

"'Talking about pairs *in cop.*, I have just been re-reading the "Descent of Man," and when Darwin talks about the ♀ *Pieris* and *Epinephele* supporting the ♂, it struck me that my impression was, out here, that facts would not conform to this. I fancied that I had never seen the ♀ supporting the ♂ in Pierines. So I have started collecting pairs *in cop.* and noting which sex carries the other. Between Aug. 18 and to-day inclusive I have got pairs of two species of *Belenois* (one each), three of a *Teracolus*, and four of *Pinacopteryx simana*, ♂♂ all supporting ♀♀. I shall continue to do this, and wish I had done so before (one's entomological sins are usually of omission!). Seeing how, broadly speaking, ♂ and ♀ *Belenois* are on a par with our home *Pieris*, the ♀ ought to carry the ♂. Also *P. simana*, in one sense, seeing that the ♀ is more blotched with black, though the ♂ has black veins better developed. I am more of the feeling that the ♂ *Pieris* should be looked on as the "brighter" owing to absence of black. What is known about say the S. American mimetic species, with black and white ♂?—i. e. which sex carries which? I remember glancing at some notes by Dr. Dixey on this point, but as I had not devoted any attention to the subject I did not read them carefully.'

"'I wrote recently that I was getting interested in the question of, when butterflies unite *in cop.*, which sex supports which. What made me pay attention to it was the "Descent of Man," where Darwin deals with sexual selection among insects, and talks of the different colours of sexes in butterflies (chap. xi. p. 319, in revised second edition of 1899). He says that in England, with *Colias edusa*, *Pieris*, and *Epinephele jurtina* "*it is the ♀♀ that support the ♂♂, so that the part which the two sexes play is reversed, as is their relative beauty*," and, later, "the ♀♀ take the more active part in the final marriage ceremony, so that we may suppose that they likewise do so in the wooing." Well, since I last wrote I have got quite a number of pairs of Pierines *in cop.*: namely, *Belenois* (two species) 7, *Teracolus* 4, and *Pinacopteryx simana* 14, in every case ♂ supporting ♀. With *Teracolus*, the ♂

being "brighter," this is as it should be according to Darwin. In *P. simana* the ♀ is of a duller white, and there is a small extra patch of dark tint on the f.w., in which also the black veins are less conspicuous than in the ♂. I have found in *one case* the ♀ supporting the ♂. With *Belenois*, however, there is a very marked difference between ♂ and ♀, though it is a question whether the ♀ *is* "brighter" than the ♂. However, the relative difference is of the same type as in the English whites. Now I see by notes of Dr. Dixey in Proc. Ent. Soc., March 17, 1915, p. 36, that he got 3 English *Pieris, ♂ all supporting* ♀, although as regards Satyrines his 6 observations all *agree* with what Darwin says. This seems curious. *Was Darwin misinformed?* I suggest that it would be a good thing to bring this point before the Ent. Soc. next spring, asking Fellows to send Pierines caught *in cop.* to the Hope Dept., clearly marking which sex supports which. For here is an opportunity for those who cannot get abroad, to work at a point of interest to Darwinists. We should in this way be able to get ample evidence. Of course notes on all species (but particularly Satyrines and Pierines) would be valuable.

" 'I may say that from what I have seen of the courtship of *Belenois*, the ♀ is *not* the most active partner. After a good deal of fluttering about one sees a ♀ settle on the ground with wings half or almost fully expanded, and the ♂ stands behind or a little above in a state of frantic excitement, and vigorously scrapes or paws the upper surface of the wings of the ♀ with his fore-limbs (? first or second pair, I am not sure of this). I witnessed yesterday the actual union of a pair of *P. simana*. The ♀ settled on the ground between some grass blades quite quietly, with wings closed; the ♂ stood on a grass stem with wings widely expanded over the ♀, so that I could not see her. The union was effected very quickly, and the ♂ flew off carrying the passive ♀. Unfortunately, owing to a gusty wind, I failed to catch this couple.'

"By the kindness of Prof. Poulton I am able to exhibit the actual specimens sent home by Dr. Carpenter; the species are as follows: *Teracolus casta*, Gerst., 3 pairs; *Herpaenia eriphia*, Godt., 1 pair; *Pinacopteryx simana*, Hopff., 5 pairs;

Belenois gidica, Godt., 1 pair; *Belenois mesentina*, Cram., 1 pair. In each of these eleven pairs the ♂ was carrying the ♀.

"Dr. Carpenter refers to a note of mine which appeared in Proc. Ent. Soc. Lond., March 17, 1915, pp. xlvii, xlviii. I there recorded six observations on the nuptial flight of Pierines, including our three common British species, and in South Africa a *Belenois* and a *Pinacopteryx.* In every one of these cases, as in Dr. Carpenter's, the male was supporting the female. I have never seen a *Colias* under these circumstances, but the combined testimony as to the genera named seems to be pretty complete. It will be remembered that in an earlier volume (Proc. Ent. Soc. Lond., Nov. 4, 1914, p. xcviii), Mr. Wheeler had noted that, according to his experience, in Lycaenids the male always carried the female, but that in Nymphalines, Satyrines and the common Pierids the female carried the male. With regard to Lycaenids and Satyrines my own observations, as given in the place above cited, are in full accord with Mr. Wheeler's, but it will be remarked that in the case of the Pierines Dr. Carpenter's observations and mine agree with one another, but not with Mr. Wheeler's. This, I think, gives ground for Dr. Carpenter's suggestion about asking entomologists to make special observations on this point, sending their notes and specimens to the Hope Department.

"It would seem that both among Pierines and Nymphalines occasional exceptions may occur to what appears to be the general rule, for while in the only instance that I have noted of the latter subfamily, *Argynnis cydippe* (*adippe*), L., the male was carrying the female, the detailed testimony of Mr. Wheeler is entirely in the opposite direction. Dr. Carpenter also seems to have observed one instance of the female *Pinacopteryx simana* carrying the male—the only one where this was the case out of many instances of the nuptial flight of this species and other Pierines observed by him.

[In the first three days of July this year, I observed at Lyndhurst eight pairs of *Dryas paphia* in flight. In six instances the ♂ carried the ♀, in two the ♀ carried the ♂. Details are given in the "Entomologists' Record," vol. xxix, p. 166.—G. Wheeler.]

"Dr. Carpenter's series is in other respects interesting. It is to be observed that all the specimens are of the 'dry' phase, some very dry. The *Terias brigitta* are less dry than the other species.

"The pairs that I have listed as *Teracolus casta* may represent a new subspecies. On the upper side they strongly resemble *T. xantholeuca*, described by Miss E. M. Sharpe from Kavirondo; but the under side is different. The distinction, however, may be seasonal; the types of *xantholeuca* were taken in January, and Dr. Carpenter's specimens in June and August."

Mr. Kaye, Prof. Poulton and Mr. Bethune-Baker commented on Dr. Dixey's exhibit.

Bred Lycaena arion.—Capt. E. B. Purefoy exhibited a short series of *L. arion* which had been bred up from the egg. After the 3rd moult they had been carried into the nests of *Myrmica laevinodis*.

Dr. Chapman congratulated Capt. Purefoy on his success in breeding *L. arion*, and said that he had larvae of *L. alcon*, sent by M. Oberthür, feeding in his ants' nests.

Mr. Donisthorpe corroborated an observation of Dr. Chapman's, that the ants, on being disturbed, carried off the larvae of Lycaenids, beetles, etc., before removing their own.

Parasites and hyperparasites of Aphidae.—Prof. Poulton exhibited on the screen enlarged photographs taken by Mr. Alfred Robinson, of the Oxford University Museum, of the parasites and hyperparasites bred from three species of *Aphidae* in the Oxford district by Mr. H. Britten of the Hope Department. The species were as follows :—

HOST (APHIDAE)	PARASITE (BRACONIDAE)	HYPERPARASITE
Macrosiphum rosae, L.	*Aphidius*, sp.	(Chalcididae) *Ceraphron*, sp.
Macrosiphum urticae, Schr.	? *Ephedrus*, sp.	1. ,, ,, 2. *Asaphes*, sp.
Drepanosiphum platanoides, Schr.	,, ,,	1. ,, ,, 2. (Cynipidae) *Allotria flavicornis*, Htg.

The parasites and hyperparasites emerged from the swollen body of both species of *Macrosiphum*, whereas in *Drepanosiphum* the Braconid larva emerged and constructed beneath its host a beautiful disc- or button-shaped cocoon from which also the hyperparasites, when present, emerged. Into the roof of this cocoon the ventral surface of the host was woven.

THE CHALCID PARASITE OF VANESSA URTICAE, L., WAITING BESIDE THE LARVA PREPARING FOR PUPATION. GOLDEN PUPAE NOT CAUSED BY PARASITISM.—Prof. POULTON exhibited 22 males and 11 female *Pteromalus*, sp., together with the Vanessid pupal shell from which they had emerged. The female parent had been seen, on Aug. 17 last, at St. Helens, Isle of Wight, patiently waiting beside the butterfly larva, which was resting motionless on a grey stone wall before it had suspended itself, and therefore many hours before pupation. On Aug. 20 the pupa was removed, and on Sept. 22 all the exhibited specimens of *Pteromalus* had emerged and were found alive and active. The life-cycle thus contrasted sharply with examples (6 males, 48 females) of *Pteromalus puparum*, L., much larger in average size, bred from *Pyrameis atalanta*, L., in 1900–01. In this case the female Chalcid had been found seated on the fresh moist pupa, Sept. 7, 1900, at Calverley station, near Bradford, Yorkshire. Ova were laid on this or the following day, and the offspring emerged at Oxford on May 22, 1901.

The pupal shell of the *V. urticae* was grey, as could still be seen, and harmonized well with the stone wall, showing that the power of colour adjustment was not removed, as some have supposed, by the presence of parasites. The normal effect of the green leaves of the nettle was to produce golden pupae—the nearest approach to green of which this species was capable. Such golden pupae were sometimes parasitised, but so were the dark pupae, as exemplified by the exhibited specimen. In former years Prof. Poulton had, by the use of the appropriate backgrounds, bred hundreds of healthy golden pupae which produced normal butterflies. The opaque cuticle of a parasitised dark pupa showed no change, but the transparent cuticle of a parasitised golden one took on a peculiar brassy appearance, probably due to changes in the stratified thin films of liquid, which, by interference of light, produced the metallic appearance. Prof. Poulton believed that a similar effect was to be seen shortly before normal emergence, but, as it lasted for a very short time, it was noticed rarely as compared with the far more enduring effect of parasitism. It was to be observed, finally, that the Chalcid parasite laid its eggs in the pupa immediately after the larval skin had been thrown off and before hardening, and that the pupal colours had been determined much earlier, during the second and third of the prepupational stages of the larva, viz. "for about 20 hours preceding the last 12 hours" before the skin is thrown off and the pupa revealed (Phil. Trans. Roy. Soc., vol. 178 (1887), B, pp. 319–98, 438–9).

A SYNAPOSEMATIC SERIES OF 272 LYCID BEETLES OF 9 SPECIES TAKEN ON ONE PLANT IN ONE DAY BY G. D. H. CARPENTER, IN LATE GERMAN EAST AFRICA.—Prof. POULTON exhibited the series referred to in the following extract from Captain Carpenter's letter of March 24, 1917, from Itigi (in 34°, 30′ E., 5° 45′ S., on the Central Railway, about 150 miles E. of Tabora), where the beetles were captured. The food-plant, of which a piece was exhibited, had been kindly determined by Dr. O. Stapf, F.R.S., as the Asclepiad *Pentarrhinum insipidum*, E. Meyer, common and widely distributed in tropical and South Africa. Prof. Poulton had added [to Captain Carpenter's table] the names of the species and the numbers by which each was represented in the collection.

"I am now sending you a small box of about 270 *Lycidae.* On 23. iii. 17 I came on a flowering creeper which had a number on it, and started picking off a few of the different species. While doing so it suddenly struck me how much you would like a large number, for the proportion of species. So I set to work to collect them all into two empty tins which soon got full. I couldn't absolutely clear the bush because more beetles kept arriving on the wing, but, practically speaking, I got 99 %. It was quite interesting laying them out after the slaughter and trying to make out how many species there were, with the aid of 17 pairs found *in copulâ.* I made out 9 species, at least, of two or probably three genera, and the numbers are as follows :—

Species 1. [58 ♂ : 52 ♀] 92 plus 6 pairs *in cop.*—[*Lycus* (*Merolycus*) *femoralis*, Bourg.]

Species 2. [51 ♂ : 26 ♀] 79 plus 6 pairs.—[*Lycus duvivieri*, Bourg.]

Species 3. [4 ♂ : 1 ♀] 3, no pairs.—[*Lycus ampliatus*, F.]

Species 4. [20 ♂ : 1 ♀] 13 plus 1 pair and an extra ♂ associated together with it.—[*Lycus trabeatus*, Guér.]

Species 5. [5 ♂ : 3 ♀] 3 plus 1 pair.—[*Lycus* sp. near *trabeatus*, Guér.]

Species 6. [2 ♂ : 1 ♀] 2, no pairs.—[*Lycus* (*Merolycus*) *rostratus*, L.]

Species 7. [3 ♂ : 3 ♀] 5 plus 1 pair.—[*Lycus* (*Merolycus*) *podagricus*, Bourg.]

Species 8. [13 ♂ : 5 ♀] 15 plus 1 pair.—[*Lycus marshalli*, Bourg.]

Species 9. [20 ♂ : 4 ♀] 20 plus 1 pair.—[*Lycus* (*Lopholycus*) *amoenus*, Bourg.]

Totals [176 ♂ : 96 ♀] 232 plus 17 pairs plus 1 superfluous (!) male.

"I am not at all sure that Species 2 does not include 2 species, but apart from *size* I could make out no essential difference. Quite a pretty little exhibit for the Entomological Society. But, alas, search as I would I could find no Lycoid mimics: there were only a number of 'Blue-bottles' and a large Pompilid which rather frightened me, as she seemed to resent my presence, and I was much afraid of her! There was one wretched little brown Syntomid moth which (however 'enthusiastic') one couldn't pretend was Lycoid! How different from Bugalla with its lovely Lycoid Fossors and Longicorn! I send a bit of the creeper, which you may like to identify."

The number of specimens was rather larger than that given by the captor—272 to 267. In the determination of these difficult species kind help had been received from the President and also from Mr. H. Britten, who had prepared the male genitalia of many specimens. The discrepancy between Captain Carpenter's numbers and those in square brackets under each of the nine species was in part due to difference between the totals and in part to the fact that a more exact comparison could be made when the material was carefully mounted. Specimens in the Hope Department identical with No. 1 had been named by Bourgeois *L.* (*M.*) *scapularis*, Murray, but they were certainly different from the unique female type of this species in the British Museum, and the President considered them to be Bourgeois' *femoralis*. No. 6 was similarly identical with specimens named by Bourgeois *L.* (*M.*) *dentipes*, Dal., var. *flavoscapularis*, Bourg., but the President considered that *dentipes* was a synonym of *rostratus*, L. Species 4 and 5 were closely similar, but the male genitalia of No. 4 resembled those of specimens in the British Museum from Abyssinia, the locality from which Guérin described *trabeatus*, and the President had therefore considered No. 4 to be true *trabeatus*.

The whole assemblage presented an extraordinarily uniform appearance, the only marked difference, on superficial examination, being in the degree to which sexual dimorphism was carried. In species No. 1 the elytra of the males were unexpanded and female-like, while there was not much difference in this respect between the sexes of Nos. 7 and 9. In Nos. 4 and 5 the males were dimorphic, the elytra of some being female-like and of others highly expanded and of a peculiar shape, similar in both forms. In all the other species the males possessed the usual broad elytra, of a very uniform shape, but differing widely from those of the females. The relative numbers of the sexes varied in the different species in an extremely interesting way.

Judging from this experience *L.* (*M.*) *femoralis* and *L. duvivieri* were the two dominant species in the locality at the time when the series was collected.

Method adopted by the African Pompilid Batozonus fuliginosus, Klug, in burying its spider prey.—The following note written by Captain Carpenter at Itigi, on Aug. 22, 1917, was read by Prof. Poulton, who exhibited the Fossor referred to. The species had been kindly determined by Mr. Rowland E. Turner as the var. *sepulchralis*, Sm., of the above-named very variable species.

"Here are some notes on a common-looking blue-black Pompilid with orange antennae found at work on June 12th, which you will find in the box. She was excavating her burrow for the spider which had been caught and paralysed and lay close by—a very procryptic species of curiously irregular shape, and dead grass colour. The Pompilid burrowed as quickly as any Fossor I have seen (except *Bembex*), in the usual way, but, unlike others, *Pompilidae* and *Sphegidae*, absolutely quietly, without any of the excited buzzing so commonly heard. Once an ant approached, and the Pompilid walked towards it in a threatening manner, with the tip of the abdomen curved strongly downwards and forwards. When the burrow was finished she dragged the spider down, going down first, backwards, and then stood in the hole and pulled the loose earth down with her anterior legs. Then she exhibited a method new to me: other Pompilids that I have seen ram down the earth firmly with steady pressure exerted by the tip of the abdomen, emitting the while a shrill buzz. (It is noteworthy that in the use of the abdomen they all agree; differing from Sphegids, which employ the front of the head as a ram.) This one, however, threw her whole body into such quick, shuddering vibrations that her outline became blurred, and one heard a succession of quick raps on the ground reminding one of a pneumatic riveting machine at work! The whole process was extremely rapid. This Pompilid therefore showed two points in her method which I had not seen before: first, the complete silence in which she worked; secondly, the rapid hammering with the tip of the abdomen."

SPIDER ATTACKING THE FIERCE PONERINE ANT MEGAPONERA FOETENS, F.—Prof. POULTON exhibited a spider and its prey taken at Itigi by Captain Carpenter on Aug. 21, 1917. The specimens were accompanied by the note: "Spider seen coming out of a nest of *Megaponera* bearing one feebly struggling, upside down in its fangs. Caught in a box the spider settled down to feed on the ant." The small size of the spider as compared with its victim, the redoubtable Termite-raider, was remarkable.

AN EAST AFRICAN DRAGONFLY-LIKE ASILID FLY OF THE GENUS LASIOCNEMUS.—Prof. POULTON exhibited the specimen referred to as follows by Captain Carpenter in a letter of Aug. 22, 1917: "On June 16 [at Itigi] I caught a curious slender-bodied Asilid of unusual colouring, which, resting on a grass stem, looked rather like a very small Agrionine." The resemblance, which was sufficiently strong in the set specimen, was probably closer in the attitude of rest. Dr. G. A. K. Marshall had kindly helped in tracking the species, which was evidently near *L. lugens*, Lw.

Mr. C. O. Farquharson's investigations into the life-histories of S. Nigerian Lycaenidae.—Prof. Poulton said that for some years Mr. Farquharson had corresponded with him on the above subject, and he hoped, as soon as a few points had been cleared up, to bring forward a detailed account of the discoveries. In the meantime the results were so interesting and important that it was desirable to make a brief announcement of Mr. Farquharson's main conclusions.

(1) The Liptenine *Lycaenidae* of the genera *Hewitsonia*, *Iridopsis*, *Teratoneura* and the genus to which "*Epitola*" *honorius*, F., belongs, possess hairy Lymantriid-like larvae which feed on the delicate filmy lichen encrusting the bark of certain forest trees infested by *Cremastogaster* ants. The larvae are not molested even when walking in the regular ant-track.

(2) *Lachnocnema* larvae not only feed on *Jassidae*, as shown by Mr. W. A. Lamborn (Trans. Ent. Soc., 1914, pp. 470, 471), but also on the secretions of immature ant-tended Membracids, as well as on insect food.

(3) Two species of *Argiolaus* feed, as larvae, on the flowers of a parasitic ant-infested *Loranthus*. The Rev. K. St. Aubyn Rogers has also recently suggested that a parasitic creeper, probably a *Loranthus*, is the food-plant of a fine species of *Argiolaus* in late German East Africa. Pupae were on several occasions found attached to the plant.

(4) *Pilodeudorix camerona*, Plötz, *P. diyllus*, Hew., and *Lycaenesthes musagetes*, Holl. (kindly determined by Mr. G. T. Bethune-Baker) feed, as larvae, on the ant-infested flowers of a species of *Pterocarpus*.

(5) Quite recently, on Sept. 10 last, the pupae of *Catochrysops parsimon*, F., were found in large numbers, together with mature larvae, in the subterranean nest of *Camponotus*

maculatus, F., var. *melanocnemis*, Santschi, at Agege, 16 miles N. of Lagos. The ants' nest had been formed in a disused part of a termitarium. This discovery confirmed Dr. Guy A. K. Marshall's conviction expressed in the following letter of Oct. 28, 1917: "I fancy all the larger African *Catochrysops* will prove to be Myrinscophilens. I obtained eggs of *C. patricia*, Trim., *C. celaeus*, Cram., *C. mashuna*, Trim., and *C. peculiaris*, Rogen., in Salisbury, all of them laid on the buds of a species of Basil (*Ocimum*); but I could never get the larvae beyond the first stage: they always died or disappeared. Later Dr. Brauns of Willowmore, Cape Colony, sent me a specimen of *C. patricia* bred in May, 1899, from a larva found at Bothaville, Orange River Colony, in the nest of *Camponotus maculatus*. One of these ants and an example of the larva may be seen beside the series of *patricia* in the British Museum.

"I believe it will be found that the ants carry off the first stage larvae of the larger African species of *Catochrysops*, and that they pass their whole time in the nests."

An observation which explains why the attacks of birds on butterflies are rarely witnessed.—Prof Poulton read the following extract from a letter received from Captain G. D. H. Carpenter, and written Aug. 31, 1917, from Itigi:—

"There is a common black bird here which I should think must be a kind of Shrike. It looks like a Drongo, but has not the curled tail feathers, and instead of sitting conspicuously on a tree and catching things in the air, it skulks about (always in pairs) among thick clumps of bush. It has a harsh cry, which is answered by the other one of the pair.

"I noticed from day to day that a pair usually haunts the same clump of bush, and as they are quite unafraid, I spent some time a few days ago (on Aug. 23rd) watching to see if they would catch any of the butterflies which were coming to the flowers of the bush—*Belenois*, *Teracolus*, *Pinacopteryx*, and a few Lycaenids. Both birds were in the bush, and I was watching one when I saw out of the corner of my eye that the other had come quite to the edge, and suddenly I heard a fluttering and the quick snap of a beak, and, looking in that direction, saw quite clearly sticking out from one side of the bird's beak a portion of a *Belenois* wing, violently vibrating—to be almost immediately swallowed : however, I saw enough to be quite certain. What particularly appealed to me was the fact that a casual observer (such as I have hitherto been about birds eating butterflies) would never have seen this : *it had to be looked for.* It's exactly as Swynnerton said in his paper in the Proc. Ent. Soc., and what Trimen said ('neglect of well-directed and sustained observation'). I don't in the least wonder that Selous had never seen a bird eat a butterfly, for he had quite possibly never especially looked for it.

"Of course I returned to that spot several times again, but either the birds weren't there, or they were hunting on the ground, or it was dull and there weren't many butterflies about, and also the blossoms began to fade, for I didn't see any more butterflies eaten. But the birds are abundant, so I live in hope. I feel so much that it's 'up to us' to produce the evidence which we know is there and only wants producing!" *

Dr. G. A. K. Marshall had written concerning the species of bird : "From his description of the bird and its habits I can have no doubt that it is the Black Cuckoo Shrike (*Campophaga nigra,* Vieill.), a bird I knew well in Mashonaland, though it was not particularly common there."

A SUGGESTED EXPLANATION OF THE OCCURRENCE OF WET-SEASON FORMS OF BUTTERFLIES IN THE MIDST OF THE DRY SEASON.—Prof. POULTON said that the suggestion contained in the following extract from a letter from the Rev. K. St. AUBYN ROGERS was of great interest, and offered a probable explanation of many puzzling irregularities. The letter was dated Aug. 13, 1917, from late German East Africa. The precise locality was not given, but Mr. Rogers probably wrote from Kongwa on the Central Railway.

* The following additional note has been received from Captain Carpenter since the above was in type—

"I saw another of these birds yesterday (September 17, 1917) hunting about at the edge of some bush about 2.30 p.m. Several Pierines had settled in the grass, as it was temporarily overcast. The bird had not noticed them, when one suddenly got up, alarmed at his approach; and he darted at it, but only just missed it, and it flew away. I think it was a *Belenois,* but couldn't be certain."

" I have some hopes that some of the things I got in the *wet* season may be of use to you, and many of the more interesting species seem to be confined to the wet season and the early part of the dry weather.

" I venture to think that the whole question of seasonal forms requires a good deal more investigation. It is not nearly so simple as might be supposed, being especially complicated by the fact that some plants, e. g. the food-plants of *Belenois* and some species of *Teracolus*, make growth throughout the dry weather. The food-plant of the common *B. severina*, Cram., and *B. mesentina*, Cram. (the latter greatly preponderating at present), starts into growth at the beginning of the dry weather, and thereupon many plants are completely stripped of their leaves by the larvae of the above species and, after a short time, start into growth again, so that there are always plants with young leaves on them during the dry weather at any rate up to date. Now it is a curious fact that many fresh specimens of *B. mesentina*, at the present time after 3 months' absolute drought, are to the best of my knowledge *wet*-season forms. I caught a pair *in cop.* last week on purpose to illustrate this.

" I feel sure that Bell's view * (that the seasonal forms are produced by the state of the food-plant) is correct in cases of this kind, but then how about *Precis* of which dry forms began to prevail a month before the end of the rains ? I hope that my collection may throw some light on this interesting question. Just here, in spite of the drought, growth does not altogether cease, e. g. the millet in the native gardens sprouts freely after the crop is reaped, and is later used for grazing. No doubt this is due to the proximity of the range of high hills to the north, as though all the torrent beds (and there is nothing else on this side) have been dry for months, yet no doubt a good deal of water must percolate through underneath. The hills on this side of the range are very steep and stony, and even drier than the plain where we are.

" I wish I were in a position to undertake breeding here, but it is quite impossible.

" *Teracolus eris*, Klug., and *T. celimene*, Luc., I have seen

* Ent. Mo. Mag., 1906, p. 121.

laying on the food-plants of *B. mesentina*, and *T. eupompe*, Klug., and *T. callidia*, Gr.-Sm., on another plant.

"They are still quite common, as are many other species of *Teracolus*, but they are all old British East African friends: still I catch a dry-season form occasionally. *T. celimene* is commoner now than in the rains. I have caught several females of this, as I believe they are not abundant in collections. They are very like *B. severina* ♂ on the wing and must be frequently overlooked."

ANOTHER INDEPENDENT OBSERVATION OF THE "FALSE HEAD" IN BUTTERFLIES.—Prof. POULTON said that his attention had been directed by Mr. E. A. Elliott to the following extract from J. Sibree's "Naturalist in Madagascar" (London, 1915, p. 254), referring probably to a Lycaenid butterfly: "While staying near the forest I was several times struck by the curious formation of the wings of one of the smaller species of butterfly. The insect in question is of plain inconspicuous colouring, chiefly shades of brown, and when at rest sits with the wings erect. The noticeable point is that there are several strongly-marked and dark-tinted processes from the hinder part of the wings, which resemble the head, eyes and antennae of a butterfly, so that when at rest it is very difficult to say which is the head and which is the tail of the insect. The tail markings and points are so much more strongly emphasized than the actual head and antennae, that it is only when the wings slightly open that one is undeceived. . . . May not the reason of this mimicry of the head by the tail be of some service in directing the attention of birds and other enemies to the less vital part of the butterfly's structure? It is evident that the hinder portion of the wings might be snapped at and broken off, and yet no serious injury be done to the vital parts of the insect."

This observation added another to the long list recorded in our Proceedings for 1906, p. lii, to which must be also added the note by Mr. T. R. Bell in Ent. Mo. Mag., 1906, p. 128. Prof. Poulton said that there was yet another recent detailed observation by a Danish naturalist to which he hoped to direct attention as soon as it was published.

W. A. LAMBORN'S OBSERVATIONS ON THE MIMETIC FEMALES

OF PAPILIO DARDANUS, BROWN, IN LATE GERMAN EAST AFRICA.—Prof. POULTON said that the following letter was written by Mr. Lamborn from Tanga, on Aug. 10, 1917. It was of great interest to receive the impressions of so keen an observer upon the resemblances in life between mimic and model and between the mimics themselves.

"You will have already learnt that I obtained seven eggs from a *hippocoon* female of *dardanus*, captured at Dar-es-Salaam. The larvae did well and I have the seven pupae, the imagos from which may now come out at any time. One pupa is malformed, but not so badly that the perfect insect is likely to be entirely valueless. I expect the females to be all *hippocoon*, for I have as yet seen no other forms along this coast, and *Amauris niavius dominicanus*, Trim., is more abundant than I ever saw it on the West Coast, and far more so than any of the other models. In anticipation of your probable wish to study the latter with the eastern forms of *hippocoon* I have secured a long series (56). These were taken in association with another *Amauris*, *ochlea*, Boisd., I think, all at one spot, mostly at rest on undergrowth beneath a Mango tree, and within the space of an hour in the early morning.

"Since I last wrote I have seen five more *hippocoon* females and have taken three, the last this morning and now in captivity. I am still not sufficiently familiar with the East Coast *hippocoon* and its model to be quite sure what the species is when on the wing. In this connexion the following incident occurred a day or two ago. I saw a *hippocoon* feeding at a flower and hovering as these Papilios always then do: *Amauris*, with the security probably born of its protected qualities, always settles to feed. I missed the *Papilio* and it flew off, with me in hot pursuit at midday over some 200 yards of burning sandy plain, and it then escaped over some bushes. But on the other side I saw it again, as I thought, and pursuing it further took it, and then discovered it to be a *dominicanus*. Returning to the bushes I beat out the *hippocoon*, but again failed to secure it, for it rose high into the air at once, as is usual when alarmed.

"I took recently my second *Hypolimnas usambara*, Ward, a male, flitting round a Mango tree in flower, and until I had it in the net, was convinced that I had been watching a *hippocoon*.* But my experience of these eastern forms is of course so limited.

"*18th August.*—The seven imagos are now out, but only two are females and both *hippocoon*, one badly malformed. However, I have put it in the box ready for postage when an opportunity offers. The other female is a very fine specimen.

"So far I have not succeeded in obtaining any more eggs, though I have seen several more *hippocoon* females, and two female forms, a *cenea*, Stoll, and a *trophonius*, Westw., feeding on flowers high up on a bank and quite out of my reach. That is the first time I have seen *trophonius* alive."

FURTHER OBSERVATIONS ON AFRICAN HESPERIDAE OF THE GENUS SARANGESA RESTING IN HOLES IN THE GROUND.—Prof. POULTON said that he had just received from Captain R. S. Wilson the following observations on the habits of *S. eliminata*, Holl., and *S. plistonicus*, Plötz, or *laelius*, Mab., in the Nuba Mountains Province of the Sudan. Among the specimens sent to Oxford by Capt. Wilson were 2 *eliminata*, taken Apr. 13, 1917, at Dilling, one of them bearing the note referred to below, and 14 taken the next day in the same locality; also 1 taken June 14, 1917, at Talodi. This latter, a worn specimen, bore the label "flowering plants," probably indicating that the Hesperid was not altogether restricted to holes and deep shade.

Sept. 14, 1917. *Talodi.*

"Re *Sarangesa eliminata*, I was most interested to receive the proof [Proc. Ent. Soc., 1916, pp. cxxix–cxxxii] you sent. My note means 'in shade: also in hole in ground.' My experience of this skipper, as regards its fondness for holes, is exactly the same as that recorded in the proof. I used when at Dilling this year generally to go out collecting for

* See also Trans. Ent. Soc., 1908, p. 497, and description of Plate XXVI, fig. 3, for the Rev. K. St. Aubyn Rogers' observations on the living *H. usambara*. Looking at a specimen in the cabinet it would be supposed that the bright orange-brown of both surfaces, especially the under, is likely to prevent a close mimetic likeness, yet both Mr. Rogers and Mr. Lamborn observed that the resemblance is strong.

an hour before sunset armed with a net and stick, and got most of my captures by beating the grass clumps and bushes on which the butterflies had settled for the night. On the first occasion when I saw *S. eliminata* there, the sun had just set, but had sunk behind a small jebel some few minutes before, and it was just getting dark. I caught sight of two or three of the skippers flitting about at the entrance of an old porcupine burrow (I had often seen butterflies in similar situations before and recognised them as some sort of skipper). I then rattled my stick round the sides of the hole, and they came out in extraordinary numbers and I caught several. I did this five or six times and some came out each time. If left alone they flitted about for a short time at the entrance and then went in again. They always settled with wings fully extended and resting flat against the sides of the burrow. I often passed this particular burrow afterwards and almost invariably found some skippers present. The hole was partly overhung by a bush which did not make it any easier to capture the skippers. I found them afterwards at Dilling in more recently occupied porcupine burrows, and also under the roots of large trees along the khor, which has high banks, where the soil had been washed away and left dark hollows amongst the roots, and also in cavities in the khor sides, but always on the west side (the khor here runs N. and S.), I presume so that the sun should not disturb them in the afternoon by shining into the hollows, as it would have done if they had been on the east bank. As regards *S. plistonicus*, Plötz, if this is a black skipper with small whitish transparent spots on the fore-wing as I think it is,* I found this first at Dilling in November, 1904, and also at Tira Mandi in the same month, and in each case recorded that they were always taken in shade. Those at the latter place I generally took

* The examples referred to by Captain Wilson are named *S. plistonicus* in Trans. Ent. Soc., 1916, p. 284. There are 5 specimens at Oxford in the collection made by him—1 from Dilling, Nov. 15, 1904 (given as 1906 by a clerical error in the paper quoted above); 4 from Tira Mandi, Nov. 23–26, 1904. In the collection of the British Museum *plistonicus* stands under the genus *Eretis*, and Captain Wilson's specimens are the same as a series (including an example from the Atbara) named *Sarangesa laelius*, Mab. The species of this genus will never be satisfactorily determined until the types have been seen and the structural characters worked out.

inside my 'rakuba,' a temporary grass-built shelter which was erected in the shade of some large trees locally called Tameiza, of the *Ficus sycomorus*, L., type. Since then I have seen both these species resting inside hollow trees such as *Adansonia digitata* (locally called Tebeldi) which grow to a vast size and are nearly always hollow."

Emission of fluid from the antennae of Acraea quirina, F.—Prof. Poulton exhibited a male example of *A. quirina*, captured in Sierra Leone probably in the neighbourhood of Freetown, June 18, 1917, by Lieut. P. A. Buxton, R.A.M.C., who had made the observations recorded in the following letter, written on June 20.

"I am circumnavigating most of the known world on my way to the Euphrates. I shall post to you a small Acraea which I took recently. When I pinched it in the net I distinctly saw drops of yellowish fluid appear, one on the club of each antenna—drops about the size of the head of a domestic pin. This seemed interesting, so I took the thing out of the net, pinched it again, and got the drops again, but much smaller. Third attempt, no drops. This is the only time I observed it, though I got lots of small Acraeas that day and subsequently, and kept my eyes open, of course. Is it an old observation?"

Prof. Poulton said that the fact had been observed by Dr. G. A. K. Marshall in *Planema aganice*, Hew., and *Acraea terpsichore*, L., f. *rougeti*, Guér. (*serena*, F., *buxtoni*, Hew.). See Trans. Ent. Soc., 1902, pp. 413 and 323 respectively.

Larva of Saw-fly with "Palisade."—The Rev. F. D. Morice exhibited a photograph of a saw-fly larva with the epidiascope and described it as follows:—

"I show a print from a negative already exhibited at a previous meeting (Oct. 3). It represents a young (living) larva of the sawfly *Lygaeonematus compressicornis*, F., feeding in the middle of a poplar-leaf, and surrounded with a sort of 'stockade,' or rather circle of little glassy nearly equidistant 'pillars,' which are believed in some way to protect it, but against what sort of attacks has never been clearly made out (Plate C, fig. 2). In another photograph I show one of the pillars separately, at a magnification of 20 diameters

(Plate C, fig. 3). It is then seen to be a compact pile of little transparent bubbles, which must have hardened immediately after being ejected by the insect. It is, however, though hardened, excessively fragile; and it is difficult to believe that it could offer any physical obstruction to the approach of any imaginable assailant of the feeding larva. Besides which, the pillars stand far enough one from the other to allow of a free passage between them. It has been suggested to me that the so-called 'stockade' has some resemblance to various objects (fungoid growths, stalked eggs, etc., etc.), and that this deceptive mimicry might serve as a protection to the larva against some particular enemy. At any rate, for whatever reason, the formation of this stockade seems to be considered by the larva as an indispensable preliminary to feeding. Miss E. Chawner tells me that she has tried the experiment of brushing it off, and that the larva then seems considerably discomposed, leaves off feeding, and presently moves away elsewhere, and forms a new circle before it ventures to recommence its meal. It is curious also that when the hole eaten in the leaf reaches a certain size, the larva reaches out and constructs a similar circle of pillars on the other side of the leaf, and that when it has reached a certain stage in its own growth it abandons its defensive system altogether, passes to the *edge* of the leaf and feeds there, just like the larvae of other Nematids, without any visible precautions against disturbance from without. This remarkable instinct, which apparently is peculiar to this one species, was first observed and fully described by the Dutch entomologist v. Vollenhofen (a former Hon. Fellow of our Society)."

The exhibitor then read extracts from an English translation (by Mr. May) of v. Vollenhofen's memoir on the subject which appeared in vol. xx of the Zoologist (1862). The insect is there called *Nematus vallator*, n.sp., its identity with Fabricius's *compressicornis* not having been realized. It is rather a pity, though it cannot be helped, that the Law of Priority reduces that which in itself is certainly the more suggestive and euphonious of these names to the rank of a mere synonym.

The Cocoon of Dicranura vinula.—Dr. Chapman exhibited some cocoons of *Dicranura vinula* that happened to show much more plainly than is usually the case the different and thinner texture where the moth is to emerge. In describing them he observed that Mr. Latter, Ent. Trans., 1895, p. 399, says: "If a cocoon is examined from the inner side while held towards the light, it will at once be seen that the walls are not of uniform thickness, but that thinner patches occur here and there. I have examined over a hundred cocoons in this way and invariably found one of these thinner areas at the anterior end opposite the head of the pupa." As viewed from the outside the thin portion of the cocoon is seldom very evident. Of those exhibited, six, made on the inner surface of the cork, show these thin places most obviously as darker patches—darker owing to having less of the cork material used in them—and these correspond in form and position to the portion of cocoon that the imago makes use of for emergence. Two cocoons on the outer surface of the cork show similar patches, but they are not seen till looked for. Other cocoons made by the same lot of larvae are equally different, only those on the inner surface of the cork showing with such marked distinctness the thin places. There seem to be no thin places at any other part of these cocoons. As I have never noted these patches before to be so evident, it seems that this particular cork surface leads to the structure being so visibly differentiated."

The Generic Name Tinea.—Mr. Stanley Edwards asked the following questions:—

"Is the President aware that in the Collections at South Kensington the generic name *Tinea* of Linnaeus is employed for two different genera in two different families of the Lepidoptera?"

"What steps does he propose to take as to this second usage in a new and unfamiliar sense of an ancient and well-known name whose application has been undoubted for generations?"

The President, Mr. Bethune-Baker and Mr. Neave spoke on the subject, and eventually it was resolved, on the motion of Mr. Bethune-Baker, seconded by Mr. Durrant, that Sir George Hampson should be invited to take part in the discussion of the question at the December meeting.

Wednesday, November 21st, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Nomination of Officers.

The following Fellows were nominated as Officers and Members of Council for the ensuing year:—

President, Dr. C. J. Gahan, M.A., D.Sc. *Treasurer,* W. G. Sheldon. *Secretaries,* Comm. James J. Walker, M.A., R.N., F.L.S.; Rev. George Wheeler, M.A., F.Z.S. *Librarian,* George Charles Champion, F.Z.S., A.L.S. *Other Members of Council,* A. W. Bacot; E. C. Bedwell; K. G. Blair; Dr. T. A. Chapman, M.D., F.Z.S.; W. C. Crawley, B.A.; H. Willoughby Ellis, F.Z.S.; Dr. H. Eltringham, M.A., D.Sc., F.Z.S.; J. C. F. Fryer, M.A.; A. Hugh Jones; Rev. F. D. Morice, M.A.; S. A. Neave, M.A., B.Sc., F.Z.S.; Herbert E. Page.

Election of Fellows.

Messrs. Frederick Walter Cocks, 26, Crown Street, Reading, and William Gerald Harding, St. Hugh's School, Bickley, Kent, were elected Fellows of the Society.

Exhibitions.

British Chrysophanus dispar, var. rutilus.—Capt. Purefoy exhibited a series of British *C. dispar*, var. *rutilus*, whose ancestors had come from the neighbourhood of Berlin before the war. They were now firmly established in a marsh in South Ireland, into which the food-plant, *Rumex hydrolapathum*, had also been introduced. The series exhibited included specimens taken in 1915, 1916 and 1917, and showed a remarkable increase in size during this short period, the ♂♂ reaching 50 mm. and one of the ♀♀ 52 mm. The depth of colouring on the upper side was also much intensified. There was still, however, much less blue on the under surface, and the orange band was also considerably less brilliant, and less continuous.

Mr. KAYE enquired whether the larvae would feed on other docks, and Capt. PUREFOY replied that they would do so, but that other docks were apt to turn brown after flowering, thus depriving the larvae of nourishment. They would not feed on sorrel.

Mr. SHELDON remarked that the var. *rutilus* must have alternative food-plants on the Continent, as he had found it not only in the Danube Marshes (where *R. hydrolapathum* grew) in the vicinity of Buda Pesth, but on many of the hills around this town far out of the range of this plant. In the neighbourhood of Sarepta also, it was found in the small cross gullies which had a small stream at the bottom emptying into the Volga some miles away. In each of these localities, although several species of dock were found, the usual food-plant did not grow.

A question having been asked as to whether *C. dispar* had ever been found out of England, the Rev. G. WHEELER reminded the Society that it had been discovered last year in Holland, and exhibited by the Hon. N. C. ROTHSCHILD side by side with English specimens. Some doubt was expressed later as to whether the Dutch specimens were really indistinguishable from the English.

PUPATION OF DYTISCUS MARGINALIS.—Mr. HUGH MAIN showed a series of lantern slides illustrating the methods he had successfully adopted for observing the larva of *Dytiscus marginalis* " digging itself in " for pupation, also the pupa in its cell, the disclosure of the imago, and the escape of the latter from the cell. He said he had exhibited on October 18, 1916, a clump of earth containing a pupation cell of *D. marginalis* which he had found near the margin of a pond in Epping Forest. Other cells subsequently found agreed in being situated along the angle between a horizontal shelf of earth and the vertical bank rising behind it. It was only necessary to reproduce such conditions in confinement to get the larva to form its pupation cell, and it was not difficult so to arrange matters that the work was done at a convenient time for observation. A small oblong glass aquarium was used, on the bottom of which was placed a layer of earth about two inches deep, and a bank of earth three or four inches high and about the same thickness was made at one end, the earth being damp and tightly pressed. At the other end a small shallow glass vessel was placed, nearly full of water and containing some water weeds and a larva. The larva was fed on earthworms and when full fed it easily climbed out of the water and soon discovered the suitably arranged bank. The larva could be hindered from commencing its work for a few hours by placing a glass plate in front of the bank, and when this was removed the larva at once started operations. Full-fed larvae were found in July, August, and September. They are very active on leaving the water, sometimes travelling ten feet or more from a pond before finding a suitable site for pupation.

In making the cell the larva removes in its jaws a small mass of earth from the face of the bank, turns round, and then, opening its jaws, it pushes out the earth with its anterior legs, depositing it to one side or behind it, thus gradually making a cavity in the bank and forming a little curved wall against the face of the bank. The inner surface of the wall is made quite smooth by pressure of the flat head, and the globular cavity which is also smoothed off is finally closed in by the mass of earth removed from the interior. The larva takes about six to eight hours to dig itself in out of sight, keeping at work nearly continuously.

The pupa was disclosed about a week after the larva had disappeared from view. It may be easily seen on carefully removing the exterior wall of the cell or on cutting the earth away and opening up the cavity from the roof. It is perfectly white at first, and only the eyes show any darkening for a time. It normally rests with its dorsal surface uppermost, lying across the cell, supported only by the prothoracic rim, which bears a number of short stiff bristles, and the two fringed processes at the tail end. The whole of the body is thus out of contact with the surrounding earth except the two small supporting areas at the anterior and posterior extremities. If disturbed, however, the pupa gives a wriggle causing it to fall over on its back, but very soon another

PLATE D.

Dytiscus marginalis digging itself in for pupation.

1 to 6. Successive stages of operations.

All slightly less than ½ natural size.

PLATE E.

Dytiscus marginalis. Pupation.

1. Exterior of pupation chamber.
2. Showing opening made by imago for exit.
3. Pupa shortly after emergence.
4. Pupa in normal resting position, lateral view.
5. " " " anterior view.
6. " " " posterior view.

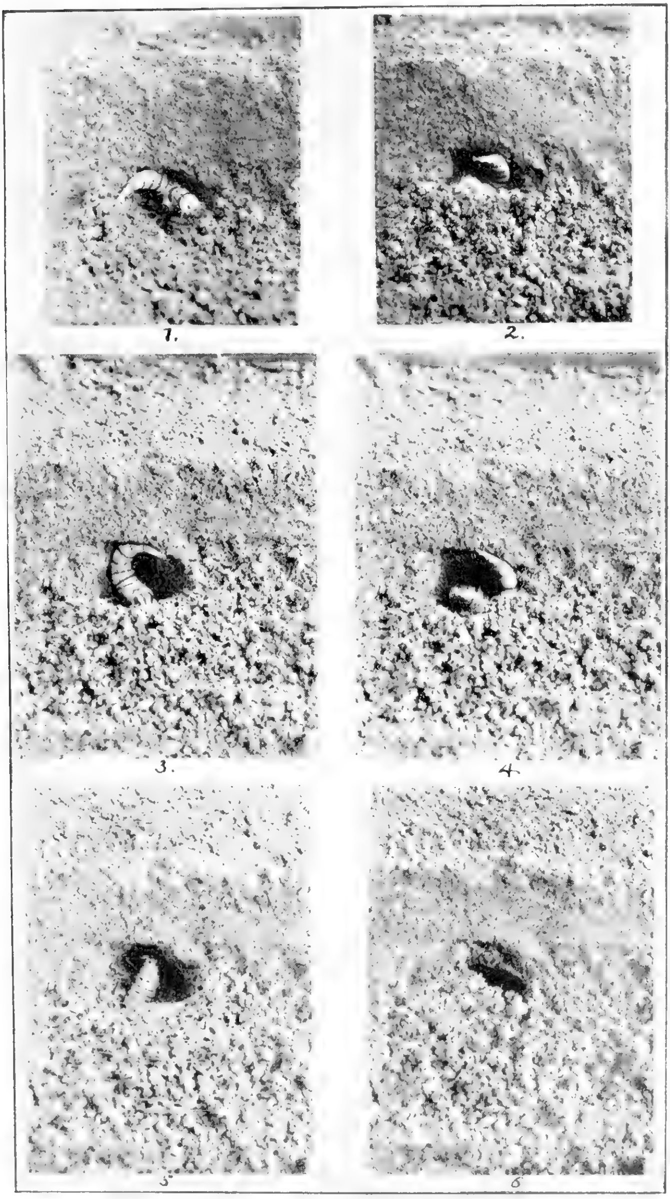
All slightly less than ½ natural size.

PLATE F.

Dytiscus marginalis.

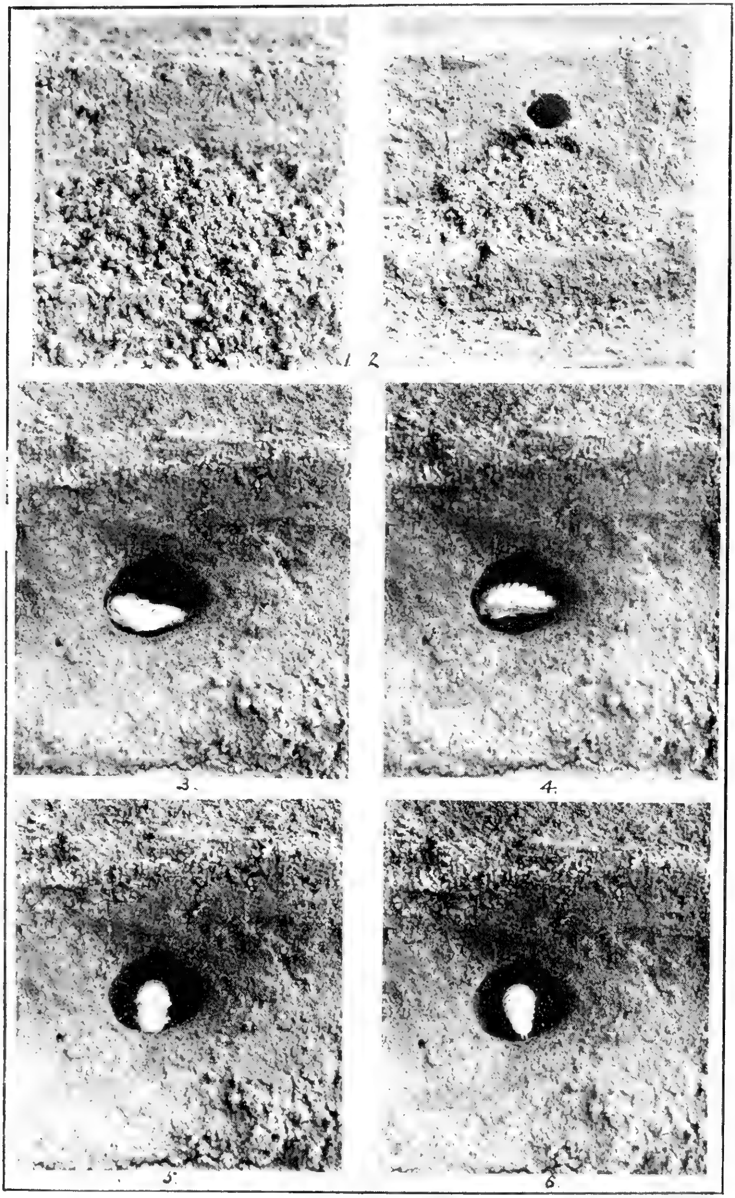
1. Male, just emerged from pupal skin.
2. Male, 24 hours later.
3. Female, just emerged from pupal skin.
4. Female, 24 hours later.
5. Artificial pond and bank for the observation of the larva preparing for pupation, etc.

1 to 4, slightly less than ½ natural size; 5, about ¼ natural size.



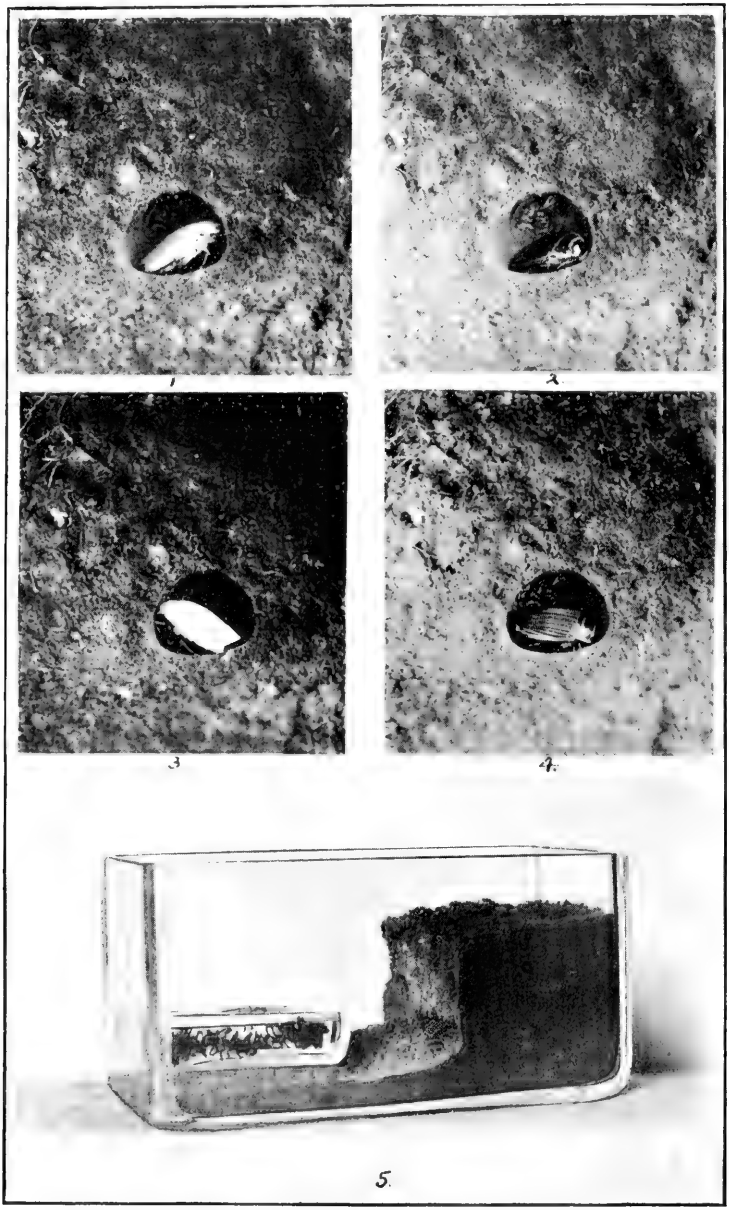
Hugh Main, Photo. *Half-Tone Eng. Co. Ltd.*

Pupation of DYTISCUS MARGINALIS.



Hugh Main, Photo. *Half-Tone Eng. Co. Ltd.*

Pupation of DYTISCUS MARGINALIS.



Hugh Main, Photo. *Half-Tone Eng. Co. Ltd.*

Pupation of DYTISCUS MARGINALIS.

wriggle raises it again into its usual resting position. The empty larval skin is pressed flat against the wall of the cell where the pupa cannot come in contact with it. After the exit of the imago the larval skin can be removed, spread out under water and the longitudinal dorsal slit observed through which the pupa had emerged.

The pupae observed remained from two to three weeks before the emergence of the beetle, only the legs and some of the terminal segments of the abdomen becoming dark. The thorax and elytra of the imago are soft and quite white or cream-coloured at first, but in twenty-four hours they have almost reached their usual coloration. The male is easily distinguished in the pupal stage by the characteristic appearance of the enlarged joints of the anterior tarsi. The insects finally escaped through a round hole made in the exterior wall towards the top of the dome-shaped interior and above the part of the wall made by the deposition of the earth from the interior of the cavity (Plates D, E, F, and G, fig. 1).

Wednesday, December 5th, 1917.

Dr. C. J. Gahan, M.A., D.Sc., President, in the Chair.

Nomination of Officers and Council.

The names of the Fellows nominated by the Council as Officers and Council for the following year were read for the second time. No other names had been received.

Election of a Fellow.

Mr. Charles Ogilvie Farquharson, M.A., B.Sc., Government Agricultural Dept., Moor Plantation, Ibadan, S. Nigeria, was elected a Fellow of the Society.

Nomination of an Honorary Fellow.

The name of M. Paul Marchal (France) was announced for the first time as having been nominated by the Council for an Honorary Fellowship, in the place of the late Dr. E. Frey-Gessner.

Exhibitions.

ABERRATIONS OF GEOMETRID MOTHS FROM EAST LOTHIAN. Miss BALFOUR exhibited a striking aberration of *Larentia didymata*, L., taken by her at Whittingehame, East Lothian, on July 24, 1917. This specimen (a ♂), which was rather large and pale, was remarkable for having a conspicuous dark fuscous marking resembling an arrow-head, formed by a wedge-like extension, towards the base, of the familiar "twin-spots" of the species. She suggested the name *cuneigera* n. ab. for this form. She also exhibited a remarkable aberration of *Melanippe fluctuata*, L., taken by Mrs. Meldola near Dunbar, East Lothian, August 12, 1912, and now in Prof. Meldola's collection in the Hope Department at Oxford.

SPIDER MIMIC OF AN ANT.—Mr. DONISTHORPE exhibited a large, very ant-like, spider together with the ant it mimics, *Polyrhachis schistacea*, Gers. subsp. *rugulosa*, Mayr., which had been captured and given to him by Mr. Hereward Dollman, F.E.S., at Mwengwa, N.W. Rhodesia, August 13, 1917. Also a small British beetle, *Brachonyx pineti*, which he had taken not uncommonly at Barton Mills, Suffolk, September 9, 1917. The object of this exhibit was to show the close resemblance between the beetle and seeds, and bits of buds from the young Scots Firs on which the former occurred. Mr. Donisthorpe said this might be described as "Camouflage."

Mr. CHAMPION pointed out that it was a very southern locality for this Scotch beetle.

DARK ABERRATION OF HIMERA PENNARIA.—Mr. E. E. GREEN exhibited an unusual variety of *Himera pennaria*, the front wings of which were almost entirely covered with dark plumbeous scales, leaving the veins picked out in bright fulvous. This form approaches a variety of *Ennomos autumnaria* figured by South ("Moths of the British Isles," vol. ii, Pl. 134, fig. 9).

CONDITIONS OF INSECT LIFE IN MESOPOTAMIA.—Prof. POULTON said that he had recently received a letter from Lieut. P. A. Buxton, R.A.M.C., contrasting the conditions encountered in Mesopotamia with those observed in Africa on the voyage.

"This is a great contrast—really *deserted* desert most of it without even camel thorn—and cultivation, gardens, dates, &c.; consequently *no* insects. Of course they may buck up in autumn or spring. The laboratory is efficient: I am doing flies, and have a great time running everywhere at my own sweet will.

"What strikes one here is the extraordinary comfort of life compared with what it must have been. You light in at some little desert post and find the fans running, and the soda bubbling, and the ice-machine clanking!"

SALT (CHLORIDE OF SODIUM) PROBABLY SOUGHT BY THE HESPERIDAE.—Prof. POULTON said that he had received the following letter from Mr. S. A. Neave, referring to the observations recorded by Mr. C. O. Farquharson:

"*Nov.* 25, 1917.

"As regards the note about the peculiar habit of *Rhopalocampta forestan*, on p. lxxx of the 1916 Proc. Ent. Soc., I have seen this exactly as described both in this species, in *R. pisistratus*, F., and in at least one of the common Parnaras, I think *P. fatuellus*, Hopff. I had noted in P. Z. S., 1910, p. 85,* that *R. forestan* was much attracted by perspiration, but had not at that time seen the moisture extruded from the abdomen. In my case there could have been no question of ink, the back of my hand or arm being the site selected, though the fluid absorbed may have been mixed with the perspiration. The extruded fluid seems to be usually colourless, but in one case, I am not quite sure in which species, but I think *R. pisistratus*, it was of a milky appearance."

Mr. NEAVE had also informed Prof. POULTON that the skippers would often settle upon the shirt-cuff and there act as above described. Now besides water the chief constituent of perspiration, and the only one likely to be of value to the insect, was salt, while the observed behaviour strongly suggested that it was some soluble substance like salt that was sought. Rapid evaporation in the sun would leave salt in concentrated solution or even dry on the skin or in parts of

* "This species is much attracted by moisture, and if one is sitting or standing still will often settle on one's hands and arms attracted by the perspiration."

the clothes in contact with it and exposed to the air, and the discharge and re-absorption of a watery fluid upon such surfaces would certainly lead to the ingestion of salt. Mr. Farquharson's observation now probably received its true interpretation, the arm of an armchair in the tropics being just the place where salt is likely to be produced by the evaporation of human cutaneous excretions. The dried ink observed to be moistened by a skipper may have contained sodium chloride or some other salt which took its place in the insect's estimation, although it is perhaps more likely that some gummy or sugary substance was sought.

[While the above note was being brought forward a letter from Mr. C. O. Farquharson, written Nov. 15, was on its way, containing in the following passage the very same suggestion as to the object of the habit :—

"By the way a medical man whom I met, who seemed a fairly observant man, told me that in his district a certain small Lycaenid was a nuisance (! !) from its habit of settling on one's hands and arms to quench its thirst on perspiration. I know of a small Hymenopteron [almost certainly the stingless bee *Melipona*] which has the same habit to a most annoying degree, but why I mention this is that it recalled to me my theory of the object of *Rhopalocampta forestan* when it settled on the arm of the chair, exuded the drops of clear liquid and finally drank them up again. The drops might easily have acquired a certain salinity."

It is to be hoped that specimens of the Lycaenid referred to may be sent home and the species identified. It is possible that the insect was a Hesperid.

Furthermore, since the note was read I have found that the habit is fully described by Mr. J. C. Kershaw in his "Butterflies of Hongkong," 1907. The following passage on p. 129 refers to *Parnara guttatus*, Bremer and Grey: "It was exceedingly common at Lo-fu-shan. One individual lit on my hand and remained for at least a minute, bending the tip of its abdomen as if about to lay an egg, but it deposited drops of clear liquid which it eagerly sipped with its proboscis. It exuded several drops in different spots, and immediately sucked them dry. This and other Hesperids may occasionally be observed depositing liquid on leaves and drinking it up."

Mr. Kershaw, who has kindly written, tells me that he has observed the habit in all the species of *Parnara* described in his book. This was at Macao, where the species are on the wing and have the habit all the year round, but he has also seen it in the Malay Islands, Australia and the West Indies. He regards it as specially characteristic of the genus *Parnara*. His letter continues: "No doubt when they do this in a hot climate on man or other animals, they must imbibe a certain amount of various salts. They will also emit liquid on any object whence they can re-imbibe it. Very likely they would get salts from various rocks and stones and earth when they void the liquid on these, as I have often (hundreds of times) seen them do.

"The habit can scarcely arise from want of moisture, since they merely drink again what they have just voided (+ whatever salts, etc., may have been taken up by the liquid from the material it has been thrown down on), and moreover they will do this when only a few inches from a stream or pool. There may be something in common with the habit of cows, which will often drink farmyard manure water as black as ink (and of course full of salts) instead of drinking pure water from the trough close by."]

Mr. E. E. Green had kindly written on the general subject:

"With regard to curious feeding habits of certain butterflies, I remember the late Col. Manders, on one of our collecting trips in Ceylon, pointing out to me how the butterflies were settling on his bare arm and hands—apparently imbibing the moisture therefrom. Although I was in an equally warm condition, I was not honoured in the same way. No butterflies showed any attraction for my skin. Manders told me, at the time, that they invariably selected him in preference to others, and he attributed the fact to his having a gouty tendency. Perhaps you can find out from one of your medical friends whether the perspiration of a gouty subject contains any substance that is not present in that of an ordinary mortal.

"Do you think that the attractive properties of urine (both human and bovine) has any connection with the other facts? It is most noticeable in Ceylon. A fellow collector used systematically to lay a trap on the sandy margin of a stream, to attract specimens of several species of *Cyaniris* (*Lycaenidae*). And I have seen large numbers of migratory *Papilios* (principally *jason* and *teredon*) collected round damp spots on the high road where the cart bullocks had been micturating. I I have taken *alcibiades* under similar conditions; but this is a very much shyer creature and never associates with the common herd.

"I am sorry that I cannot speak with certainty of the species that were feeding on Manders's arm, but I do not think that they were *Hesperidae*. I am almost certain that *Lethe drypetis* was one of the visitors, and I think that *Pyrameis cardui* was another."

Urea was a constituent of perspiration, although usually present in very small quantities, and it might well have been the attraction in the observation recorded by Mr. Green. In the *Hesperidae*, on the other hand, it seemed more probable that the attraction was salt.

Papilio polytes romulus, Cram., from the extreme south of India and from the mainland opposite Singapore Island.—Prof. Poulton said that he had recently been given the opportunity of studying a long series of *P. polytes* collected 1905–16, by Mr. J. Williams Hockin, on the W. slopes of the Ashamboo Hills, from 6 to 40 miles N.W. of Cape Comorin. The series, which was of great interest in relation to the forms of the species recorded from Ceylon, was composed as follows:—

Males—30.
Male-like female (*cyrus*)—1.
Aristolochiae-like female (*polytes*)—12.
Intermediate female—1.
Hector-like female (*romulus*)—21.

The single intermediate female had the fore-wings of *polytes* and the hind-wings of *romulus*, with reduced red markings outside the cell and traces of the pale scales of *polytes* within it. The pattern was precisely the same as that of some of the Bornean females of *P. polytes theseus*, Cram., in the Hope Department.

Of the 12 *polytes* females, 4 were the *stichius* form, with no white in the hind-wing cell, 4, with slight indications of white, were intermediate between *stichius* and *polytes*, while 4 were *polytes*. The 21 *romulus* females varied very greatly in the development of the red markings in the hind-wing.

Although from the part of the mainland that is very near to Ceylon, the differences were strongly marked. Thus, in Ceylon the *cyrus* female was considerably commoner than either mimetic form, while *romulus* was generally looked upon as only rather commoner than *polytes*. But in Mr. Hockin's series *romulus* was nearly twice as numerous as *polytes*, while *cyrus* was apparently much rarer than either. Again the *stichius* form of *polytes*, almost unknown in Ceylon, was very strongly represented in the exhibited series.

The high proportion of *romulus* females was probably to be accounted for by the relative numbers of the two models; for H. S. Ferguson, on p. 446 of his list,* described *aristolochiae* as "common in the low country and the hills," but *hector* as "very common" in the same area. Mr. Hockin agreed, summing up his experiences as follows: "I should say *hector* was decidedly more common than *aristolochiae*, though the latter would take its place as the second commonest *Papilio* all the year round over the widest area: *polytes* would be third, but several lengths behind."

Prof. Poulton hoped to study the patterns of the Travancore *aristolochiae*, as it was possible that the prevalence of *stichius* and *stichius*-like females might be thus explained.

Two of the males, 12 *romulus*, and all the other female forms were exhibited to the meeting.

Mr. Hockin had kindly described the character of the interesting locality in which he had collected for so many years:—

"Before saying anything about the range of *polytes*, etc., I had better give you an account of the different belts of country. The Ashamboo Hills run parallel with the coast, with their foot at 15 to 20 miles from it. The hills them-

* "A List of the Butterflies of Travancore," in Journ. Bomb. Nat. Hist. Soc., 1891, p. 432.

selves may be about 5 miles wide on their western face and less on the eastern looking down on Tinnevelly, which is very steep, and I don't think my men ever went to the eastern face. The top of the ridge is about 5000 ft., of which the upper half is grass with a few woods scattered about. At the northern end, however, there is a big block of forest on a plateau 4500 to 5000 ft., where I fancy *Papilio tamilana* and *buddha*, which were unknown to H. S. Ferguson (*ibid.*), were found. But my men did not often go there, as it was far away with no inhabitants but bear, bison, and elephant, which they feared. The lower slope was tall heavy forest (trees 100 to 150 ft. high), with dense bamboo jungle at the foot. This bamboo jungle (Bamboo mixed with trees such as Blackwood, Iny and other trees about the height and habit of English trees) extends some 6 miles from the foot of the hill and is succeeded by rounded hills of laterite, 200 to 300 ft. high, with rice-fields in the hollows and grass-fields on the higher land. These grass-fields have cactus hedges and hedge-row trees of Palmyra, Jack, Banyan and Mango and also leguminous trees grown for leaf manure for the paddy-fields. Further out in drier country are Tamarind and Neem or Murgossa trees. On the last belt, next to Tinnevelly and about 7 miles wide, comes a very dry area (similar to Tinnevelly country); where only Palmyra, Tamarind, Neem, and Babul trees grow with Cactus hedges round grass-fields. These fields are sometimes planted with peas in the moonsoon, and horse-grain in October to December in all but the very dry belt. In the wetter part nearer the hills low scrub jungle grew up wherever there was no cultivation, and this was felled and planted with tapioca for two years, then left to grow scrub again for two or three years. Sometimes hill rice or other grain was sown for one year on the cleared land, or it was put permanently under Plantain or Banana trees.

" Annual rainfall 150 to 200 inches, over 2000 ft.; 90 inches at foot of hills and 6 miles out, falling to 30 inches in middle of cultivated tract, and 15 inches in very dry belt. In Tinnevelly town, 40 miles E. of Travancore boundary, it is 13 inches. This applies only to the 20 miles at the S. end of the Ashamboo Hills where I collected.

"Most of the *Papilioninae* and big *Nymphalinae* were found in the lower half of the hills and the bamboo jungle at their foot. *P. hector*, *aristolochiae* and *polytes*, however, were plentiful all over the cultivated part with hedgerow trees, except in the very dry belt. *P. erithonius* and *agamemnon* were common in the wetter half of the cultivated belt. *P. dissimilis* is the only one I remember on the higher grass over 2500 ft. (except perhaps *tamilana* and *buddha* in forest at that height on the northern plateau). I used constantly to see *P. hector*, male and female, flying in cop., one flying and carrying the other, whose wings were closed. It is so difficult to tell *romulus* ♀ from *hector*, and *polytes* ♀ from *aristolochiae*, when flying that I am afraid I can't add anything as to their frequency from observation to what the numbers in the collection will tell you. The same applies to *cyrus* ♀ and the males of *polytes*. As to damage by birds I had better go through all my damaged specimens later and write you separately about that. The chief preyers on butterflies were bee-eaters (especially the blue-tailed and chestnut-headed species) and drongos. We used often to find wings of *hector* under a tree. By the bye, I think I can account for Ferguson calling *P. nomius* very rare. I only once saw it in September—otherwise only in March to May. The latter is the unhealthy season when coffee planters stopped work and went for a holiday, and no one who was not obliged to went into the malarious belt at the foot of the hills. Now we were building a big dam then, which took us four years to build, and we did most of the work in March to May because there was no cultivation then and labour was plentiful."

H. S. Ferguson (*ibid.*, p. 446) also gave the range of *polytes* in nearly the same words as those used for its models, speaking of it as "common in the low country and up to 2000 ft. on the hills. The three forms of the female occur."

Prof. Poulton also exhibited a female of the *cyrus* form, unfortunately the only example of this sex in a little series sent by Dr. R. Hanitsch in continuation of that described in our Proceedings for the present year, p. xxx. The specimen was taken in Johore on July 19, 1917. Accompanying it were 3 males taken on the same day, 1 on July 17, 4 on June 29, and 3 in May. Dr. Hanitsch hoped to secure a long series in August, so that data would be available for estimating the proportions of the two female forms.

THE MYMARID CARAPHRACTUS CINCTUS TAKEN AT OXFORD IN 1917.—Prof. POULTON read the following communication by Mr. A. H. Hamm of the Hope Department, and exhibited examples of the specimens referred to :—

" It is so long since any record of the capture of *Caraphractus cinctus*, Hal. (*Polynema natans*, Lubbock), has been made that a few notes on its occurrence near Oxford may not be without interest.

" On September 22 last, my friend and colleague Mr. H. Britten and I were ' fishing ' for *Anopheles* larvae and pupae in small clay-holes in a brick-field in the Kimmeridge Clay on the west side of Shotover Hill, near Oxford. When sorting over our captures in the evening we were surprised to find we had both, quite accidentally, taken *C. cinctus*. We kept the specimens alive for a few days in order to observe their mode of progression in the water. A week later, on September 29, we again visited the same ponds fully prepared to obtain more, if possible, of this interesting insect; in this we were entirely successful, and between us we took over twenty individuals of both sexes, all, without exception, obtained from a very small clay-hole of about two square yards in area. On October 6 Mr. Britten went alone to the same little pond and again succeeded in taking a fair number of both sexes. The next visit was not until October 20, when I went alone, and found them as before in some numbers. We visited the same pond together, for the last time, on October 27, but on this occasion, after spending an hour or more, we could only find two individuals, one alive and the other dead.

" On each occasion we took the insects home alive in the jar containing our other aquatic captures, and then turned the contents into a shallow saucer, in order to sort over the material obtained. It was on one of these occasions that a number of the *Caraphractus* were observed to come to the surface of the water and fly very rapidly from side to side of the saucer, just skimming the surface of the water, in the manner of a frightened water-fowl such as the Grebe.

"Their progression under water—comparatively slow, and effected by means of a series of jerks—was clearly due to flying rather than swimming, but they also made use of their legs, the posterior pair being kicked out behind simultaneously with the movement of the wings.

"We found that individuals kept in confinement always preferred to crawl about among the *Spirogyra* in preference to any other water plant. Several were kept alive by Mr. Britten for about a week.

"One male was observed to make an unsuccessful attempt to pair with a female on the surface of the water, by climbing on to her back. A *Corethra* larva once seized a male by his legs and held on for some time until induced to leave go by means of a camel's-hair brush.

"The small pond or clay-hole in which all the examples, except one, were taken, contained the usual common aquatic insects in abundance, and the vegetation was also of the usual pond type.

"The occurrence of this species so late in the season is interesting, as those taken by Lubbock * were obtained in August, and for those recorded by Burton † and Enock ‡ the month is not given."

Mendelian Heredity in relation to selection.—Prof. Poulton drew attention to two recent papers by Prof. H. S. Jennings of Baltimore, U.S.A.: (1) "Observed Changes in Hereditary Characters in Relation to Evolution" (Journ. Washington Acad. Sci., vol. vii, No. 10, May 19, 1917, p. 281), and (2) "Modifying Factors and Multiple Allelomorphs in Relation to the Results of Selection" (American Naturalist, vol. li, May, 1917, p. 301). In (1) the author, referring to the discoveries of the French botanist Jordan and to the work of Johannsen on "pure lines," expressed the conclusions to which many naturalists have been led, viz. "that most of the heritable differences observed between closely related organisms—between the members of a given species, for

* Trans. Linn. Soc., 1863, vol. xxvi, p. 135.
† Journ. Quekett Micros. Club, 1894–7, vol. vi, ser. II, p. 148.
‡ Journ. Quekett Micros. Club, 1894–7, vol. vi, ser. II, p. 275.

example—are not *variations* in the sense of alterations; are not active *changes* in constitution, but are permanent diversities; they are static, not dynamic. . . . All thorough work has led directly to this result: that any species or kind of organism is made up of a very great number of diverse stocks, differing from each other in minute particulars, but the diversities inherited from generation to generation." These facts were particularly evident in the Protozoa, reproducing by a single parent, as shown in Prof. Jennings's researches on *Paramoecium* and *Difflugia*, both of which were "found to consist of a large number of such heritably diverse stocks, each stock showing within itself many variations that are not heritable." Selection might indeed operate, but it was the selection of diversities that were already present, and thus led to no new steps in evolution. [Just as it was shown on p. lxxxi that a Bornean mimetic female form of *Papilio polytes* was present as a very rare variety in Travancore, so it might be held that all mimetic patterns of the species were also present and could be made predominant by selection without requiring any new step in evolution.] "Variations . . . were not variations at all, in the sense of steps in evolution; they were mere instances of the static condition of diversity that everywhere prevails."

Well might the author conclude "in these days of plots and spies, the evolutionists might almost feel that the enemy had crept into their citadel and was blowing it up from within." But of course naturalists do not maintain that changes never take place: "they admit that *mutations* occur"; that the permanent germinal constitution or genotype "may at rare intervals transform, as a given chemical compound may transform into another and diverse compound." A favourite theory of evolution may be outlined thus: "Organisms forming a multitude of diverse strains with diverse genotypes; the genotype a mosaic of parts that are recombined in Mendelian inheritance; selection a mere process of isolating and recombining what already exists; large changes occurring at rare intervals, through the dropping out of bits of the mosaic, or through their complete chemical transformation; evolution by saltations."

The author points out the difficulty involved in the very existence of the minute strains, which must surely have arisen at some time or other, and arisen " not by saltations, for the differences between the strains go down to the very limits of detectibility." Then there is the difficulty of " complex adaptive structures, such as the eye."

Therefore many investigators could not feel satisfied with the favourite theory and have been " looking for something besides saltations as a basis for evolution; looking for hereditary changes that would permit a continuity in transformation." Among these investigators W. E. Castle has been searching in the phenomena of biparental inheritance, H. F. Osborn in the records of palaeontology, and the author in organisms subject to uniparental reproduction. In this latter " we meet the problem of inheritance and variation in its simplest form; for there is nothing which complicates genetic problems so enormously as does the continual mixing of diverse stocks in biparental inheritance. In uniparental reproduction we have but one genotype to deal with; we can be certain that no hereditary characters are introduced from outside that genotype."

Accepting as a foundation the facts already mentioned " as to the make-up of the species out of a great number of diverse stocks; as to the usual effects of selection being nothing save the isolation of such pre-existing stocks," the author undertook " a most extensive and intensive study of heredity, of variation, and of the effects of selection for long periods " within a single stock of a favourable organism. This he found in the Rhizopod *Difflugia corona,* which has " numerous distinctive characters, all congenital; all inherited in a high degree; yet varying from parent to offspring also; none of these characters changed by growth or environmental action during the life of the individual."

" Long-continued work showed that a single strain of this animal, all derived by fission from a single parent, does differentiate gradually, with the passage of generations, into many hereditarily diverse strains." While these variations " arose in some few cases by rather large steps, or 'saltations,' " " the immense majority were minute gradations. Variation is as continuous as can be detected." Variation occurred in many diverse characters and gave rise to many diverse combinations of characters. "Any set of characters might vary independently of the rest. The hereditary variations which arose were of just such a nature as to produce from a single strain the hereditarily different strains that are found in nature."

After giving an account of these results obtained from an organism with uniparental reproduction, the author briefly refers to Osborn's palaeontological evidence "for evolution by minute continuous variations which follow a single definite trend," and to Castle's evidence that "in rats he can, by selection, gradually increase or decrease the amount of color in the coat, passing by continuous stages from one extreme to the other," the change being "an actual change in the hereditary characteristics of the stock; and not a mere result of the recombination of Mendelian factors." From this point the author proceeds to a critical examination of results obtained by T. H. Morgan and his associates upon a species which comes directly within the survey of the Entomological Society, viz. the fruit-fly *Drosophila*. The species has normally a red eye, but in the few years during which these researches have been conducted it has come to present "seven gradations of color between white and red, each gradation heritable in the normal Mendelian manner"—"red, blood, cherry, eosin, buff, tinged, white." "Three of these grades have been discovered in the last five months. It would not require a bold prophet to predict that as the years pass we shall come to know more of these gradations, till all detectible differences of shade have been distinguished, and each shown to be inherited as a Mendelian unit. Considering that the work on *Drosophila* has been going on only about seven or eight years, this is remarkable progress toward a demonstration that a single unit factor can present as many grades as can be distinguished. . . ." But this is not all. As regards the middle member of the series of eye colours, eosin, Bridges has found seven modifying factors, each of which alters its intensity and gives rise to a secondary grade of colour. Now each of these modifying factors are described "specifically as mutations; as actual changes in the hereditary material."

The results are summarised as follows: "In *Drosophila* there occur minute changes in the germinal material, such as to give, so far as our present imperfect knowledge goes, seven diverse grades of a color which is itself only one grade of another series of seven known grades. By means of these graded changes one could obtain, by the mutationist's own statement, the continuously graded results which selection actually gives. What more can the selectionist ask?"

As the author remarks in paper (2), "The work in Mendelism, and particularly the work on *Drosophila*, is supplying a complete foundation for evolution through the accumulation by selection of minute gradations. We have got far away from the old notion that hereditary changes consist only in the dropping out of complete units, or that they are bound to occur in large steps. . . . The objections raised by the mutationists to gradual change through selection are breaking down as a result of the thoroughness of the mutationists' own studies."

The importance of Mendelism as an aid to selection is insisted on in the same paper. "Hereditary variations, such as give rise to the multiple allelomorphs and multiple modifying factors, occur in some organisms rather infrequently, as measured by the time scale of human happenings. If there were no interchange of factors among individuals and stocks, it would take a long time to obtain in one individual all the six diluters of the eosin color of the *Drosophila* eye; one arises in one individual, another in another. But by selective cross-breeding it is possible to bring together into one stock all the modifiers that have been produced in diverse stocks. Mendelism acts as a tremendous accelerator to the effectiveness of selection."

Returning to paper (1), the author finally concludes that "Evolution according to the typical Darwinian scheme, through the occurrence of many small variations and their guidance by natural selection, is perfectly consistent with what experimental and palaeontological studies show us; to me it appears more consistent with the data than does any other theory."

A VERY ANCIENT BEETLE.—The PRESIDENT exhibited a specimen of a Carabid Beetle, *Calosoma rugosum*, de Geer, found in the stomach of the mummy of an Ibis, the date of which was reckoned to be about 1500 B.C. For comparison a modern specimen of the same species was shown, no difference between them being visible.

PUPATION OF GEOTRUPES TYPHOEUS.—Mr. HUGH MAIN exhibited a series of lantern slides illustrating the metamorphoses of *Geotrupes typhoeus* (Plates G, H, J).

He said that as he had wished to observe the life-history of *G. typhoeus* he collected a number of the beetles in the autumn of 1915. They were more easily dug up in their usual localities before hibernation, as in the spring they were generally at a much greater distance below the surface of the ground. After remaining quiescent through December, they showed signs of activity in January (1916), and were separated into pairs, which were placed in Subterraria filled with fresh sand, together with some food consisting of horse- or cow-dung at the top. Although rabbits' pellets or those of the sheep or deer are perhaps the usual food, he had frequently found the beetles under the droppings of horses and cattle. The "Subterrarium" is an observation cage which he had devised for the purpose of following the life-history of insects whose activities were carried on under the surface of the earth. It consists essentially of two vertical sheets of glass fixed half an inch, or more or less as required, apart, the intervening space being filled with earth or sand, into which the insects burrow.

Before the end of January 1916 a number of shafts were made by the beetles in several of the cages. A quantity of food was carried down and packed into each shaft, an egg having previously been deposited in the sand about half an inch from the first layer of the food. Each food-mass was about five inches long, and was followed by a plug of sand about two inches long. After the first was completed, a second shaft was sunk from just above the first plug of sand, and then a third and fourth.

Three such shafts are shown in Plate G, fig. 2, that on the right being the first made, then the middle one, and finally the left one. The beetles were then removed, so that their further excavations should not disturb the work already completed.

PLATE G.

1. *Dytiscus marginalis.* Empty larval skin from pupation chamber; natural size.
2. Subterrarium with three full-fed larvae of *Geotrupes typhoeus* in their pupation chambers; reduced.
3. *G. typhoeus,* larva, full-fed; nearly natural size.
4. *G. typhoeus,* pupa, ♂, recently disclosed; nearly natural size.

PLATE H.

Geotrupes typhoeus.

1. Larva, full-fed, in pupation chamber, awaiting pupation.
2. Pupa, ♀, recently disclosed.

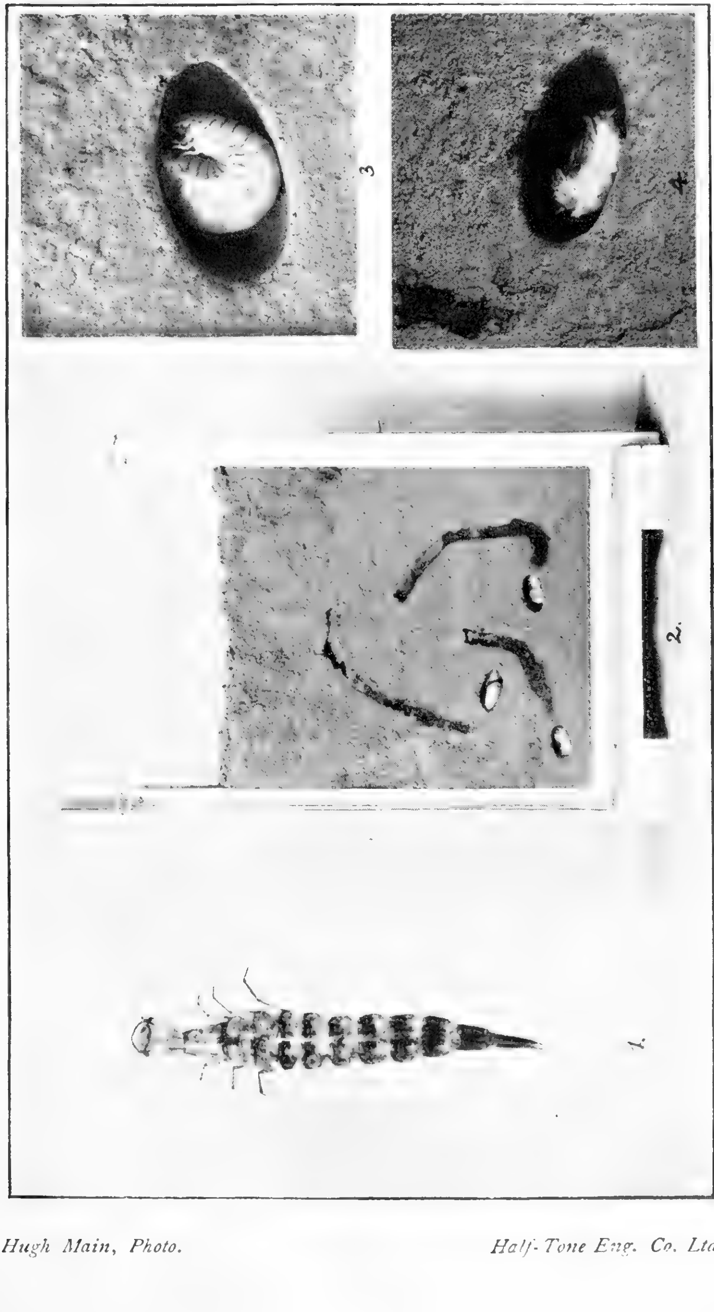
Both about natural size.

PLATE J.

Geotrupes typhoeus.

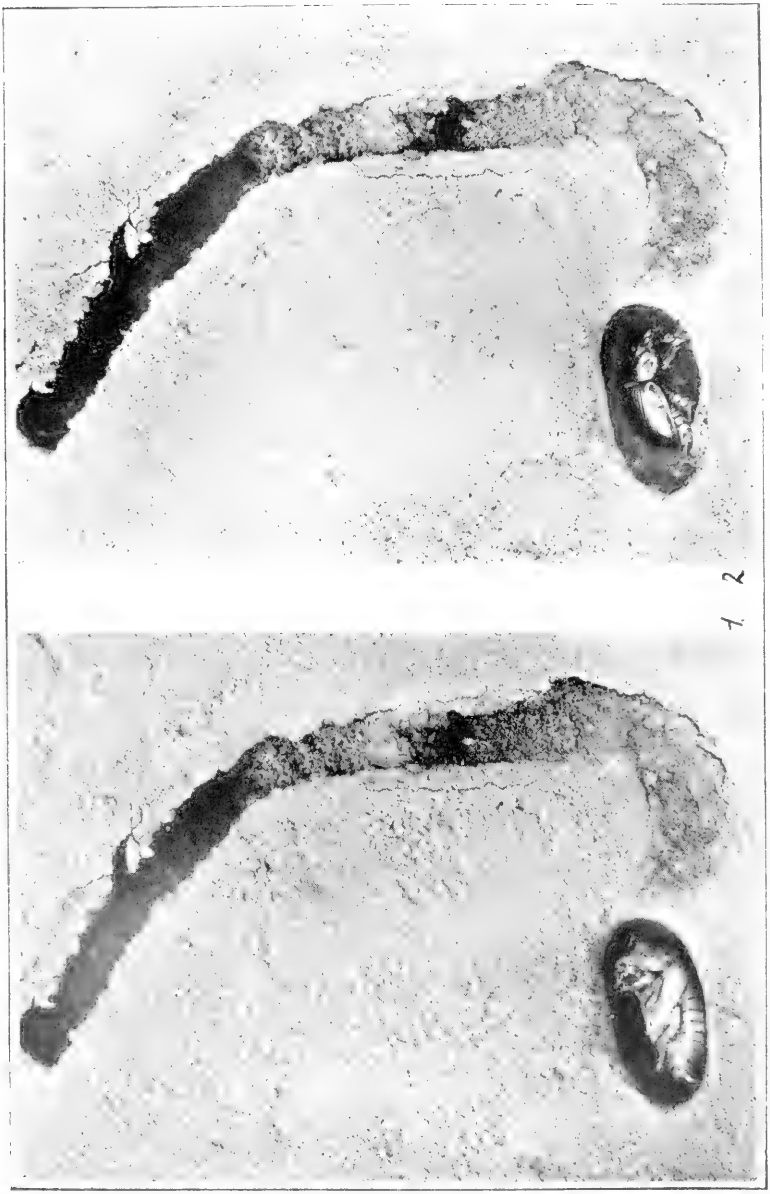
1. Pupa, ♀, mature.
2. Imago, ♀.

Both about natural size.



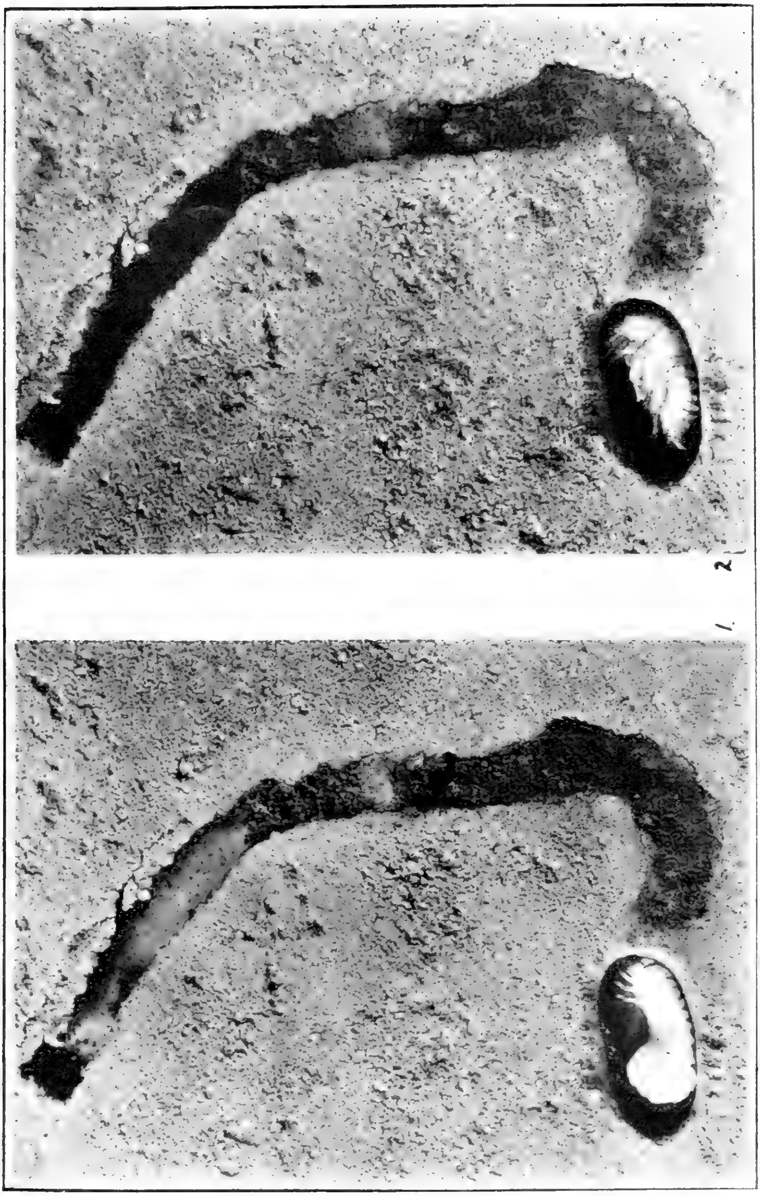
1. Cast larval skin of Dytiscus Marginalis. 2-4. Pupation of GEOTRUPES TYPHŒUS.

Hugh Main, Photo. *Half-Tone Eng. Co. Ltd.*



Pupation of GEOTRUPES TYPHŒUS.

Half-Tone Eng. Co. Ltd.



Pupation of GEOTRUPES TYPHOEUS.

Hugh Main, Photo. *Half-Tone Eng. Co. Ltd.*

The young larvae were first seen about the end of February, and they ate their way to the top of their food-mass and then back again to their starting-point, which was only reached in August 1917, when they were full-fed. Each then formed an oval pupation chamber in the sand beyond the old food-mass, and then lay on its back to await pupation. The larva does not possess the stridulatory apparatus which occurs on the second and third legs of the other members of the genus *Geotrupes*. Probably the continental coleopterists are well advised in placing *typhoeus* in a separate genus (*Minotaurus*) on account of the morphological peculiarities of the larva.

The larvae pupated towards the end of August, and the imagines appeared in September. The pupa is quite white at first, but the eyes soon darken and then the legs and thorax. The elytra of the newly disclosed beetle are quite white, and pass through various shades of brown to jet black.

Lack of time and opportunity in the present circumstances prevented detailed observations being made as desired, but, having seen the various successive stages as they appeared and being prepared for them, it should be easy in more peaceful times to repeat the experiment and to note carefully the exceedingly interesting operations carried out in full view in the Subterrarium. M. H. Fabre has written a graphic account of the life-histories of a number of the Dung Beetles, but his volaries did not allow him to see actually what was going on underground, and some of his conclusions are not confirmed by observations made in the Subterraria.

In answer to a question by the PRESIDENT, Mr. MAIN said that possibly the purpose of the stridulation was to warn away earthworms, which have a dislike to vibration.

LARVA OF CHAEROCAMPA ELPENOR.—Mr. MAIN also showed two slides of the larva of *C. elpenor*, one at rest, and one in its so-called "threatening" attitude after being disturbed. In reply to a question by Prof. POULTON he said that the larva did not adopt that attitude while on the food-plant.

MIMICRY IN CERTAIN BUTTERFLIES OF NEW GUINEA.—Dr. F. A. DIXEY exhibited some drawings of butterflies illustrative of his paper on this subject, of which he gave the following abstract:—

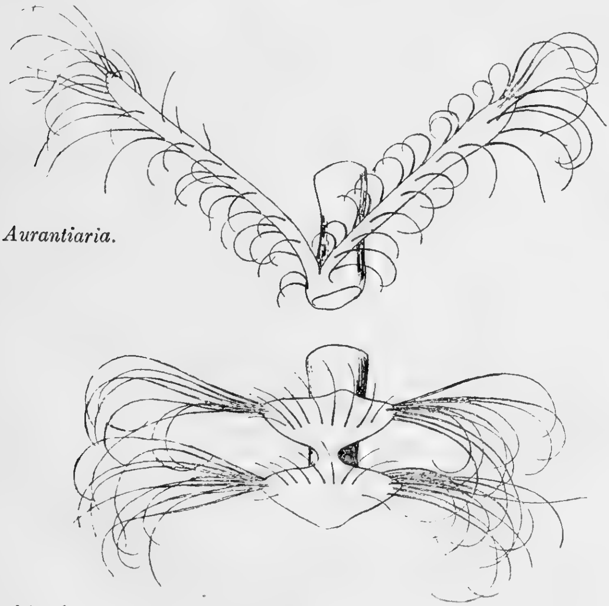
The resemblance between the Pierine *Huphina abnormis* and a form of the Nymphaline genus *Mynes* was remarked by Wallace more than fifty years ago; and in later times an even closer likeness has been found to exist between the *Huphina* and one or more species of the Pierine genus *Delias*. The superficial resemblance is so great as to have misled good lepidopterists as to the actual affinities of these forms; and great confusion has prevailed with regard to their relative position in a systematic series. The mistakes thus started have not been confined to the species originally concerned, but have extended to other forms of a more or less similar aspect.

On the evidence of neuration, scent-scales and genitalia, there is no doubt that Wallace's *abnormis* is neither a *Tachyris* nor a *Delias*. The same is true of Honrath's *euryxantha*, which may possibly be conspecific with *abnormis*. The affinity of these two Pierine forms, as was first recognised by von Mitis, is with Moore's genus *Huphina*, of which they may be considered to form a subordinate section, characterised by slight peculiarities of structure. The same combination of black and scarlet as in *H. abnormis* is presented by the underside of the male of *Delias irma*, Fruhst.; though here, there being no white fore-wing area, the resemblance to *D. ornytion* and *H. abnormis* applies only to the attitude of the latter forms during complete rest. There is no scarlet submarginal series in *D. irma*, nor in *D. ornytion* from Western New Guinea; but as the range of *D. irma* does not appear to extend to the latter region, no particular significance can be attached to this fact.

While *H. abnormis* thus approaches the aspect of one group of *Delias*, the closely allied, or, as some think, conspecific *H. euryxantha* bears considerable resemblance to another; viz. the group formed by *Delias mysis*, Fabr., and its near allies, particularly the New Guinea subspecies *D. lara*, Boisd. With regard to *Mynes doryca*, Butl., it is observable that the scarlet mark on the fore-wing corresponds roughly with that on the hind-wing of *H. abnormis*, and *vice versâ*.

The resemblance between these forms extends in many cases to the upper as well as to the under surface; though here it is naturally less striking, being merely a common version of a usual Pierine pattern. It is, however, remarkable that *Mynes*, a Nymphaline, should possess an upper surface so strongly Pierine in aspect. A further point of interest is the fact that *Nepheronia jobaea*, Boisd. ♂, the only member of its genus to reach New Guinea, shows on its upperside a likeness to *Mynes doryca*, which may extend even to the tint of the pale ground-colour; while its underside, though without red markings, is somewhat suggestive of a *Delias*.

How far the principle of mimicry enters into these combinations may of course be questioned. That it has some influence can hardly be doubted. More information as to the bionomics of the forms referred to would be very welcome; especially with regard to their distribution and habits.



Aurantiaria.

Defoliaria. × 75.

A noticeable Difference in the Antennae of closely related Species.—Mr. Green showed (on the Epidiascope) an enlarged drawing of single joints of the male antennae of *Hybernia defoliaria* and *H. aurantiaria*, and pointed out the structural differences between the antennae of these closely allied species. In *defoliaria* the pinnae are very short, but there are two pairs on each joint; whereas *aurantiaria* (with the remaining British members of the genus) has a single pair of elongated pinnae on each joint. A preparation of the two antennae was exhibited under the microscope.

The Rev. F. D. MORICE and other Fellows gave parallel instances of difference of antennae in the case of closely related insects.

Papers.

The following papers were read :—

"Descriptions of new species of Staphylinidae from Singapore," by MALCOLM CAMERON, M.D., R.N., F.E.S.

"Coleoptera of the Families Ostomidae, Monotomidae, Colydiidae and Notiophysidae from the Seychelles and Aldabra Islands," by the late ANTOINE GROUVELLE; communicated by HUGH SCOTT, M.A., F.L.S., F.E.S.

Discussion.

In accordance with the Resolution passed at the meeting on Nov. 1st, a discussion took place on Sir George Hampson's method of taking the first species mentioned by the author of a genus as the type, without reference to the action of subsequent authors in fixing types.

In opening the discussion the PRESIDENT said that he had, in accordance with the Resolution, invited Sir George Hampson to be present and to state his views, but had received a letter in reply, which he read, saying that he was unable to be present, but that a statement of his views was given in the "Novitates Zoologicae," and in a paper which he hoped would be printed in time to send a copy to the meeting. The President read the first statement referred to, but said that he had not received the other paper.

Prof. POULTON read a further statement from Sir George Hampson, but took no part in the discussion.

Sir GEORGE HAMPSON sent the following remarks with regard to the use of the name *Tinea* :—

"The position is this :

"The Clothes-moths were called *Tinea* by all authors previous to Linnæus, but 1758 was arbitrarily fixed as the date of the commencement of Zoological nomenclature, and Linnæus unfortunately described *Tinea* from the wrong species; therefore either the foundation of Zoological nomenclature must be abandoned or the use of *Tinea* altered.

"I stated the dilemma to Mr. E. Meyrick, whose only reply was that 'types were made for science, and not science for types,' *i. e.* he acknowledged the facts, but thought they should be ignored."

He also asked, "Why are Scopoli's genera for Butterflies in 1777 ignored?" and gave a list of these genera and of the names they would displace.

Dr. G. A. K. MARSHALL pointed out that, in contrast with the haphazard method of the earlier zoologists of applying to animals such scientific names as they thought fit, without regard to the names used by other workers, our modern system of nomenclature has been built up on the principle that all valid systematic work done by earlier authors must be recognised. With this principle, the so-called "law of priority," the method adopted by Sir George Hampson, in opposition to all other entomologists, is in direct conflict; for in defining the older genera he has assumed the first species mentioned by the original author to be the type, and has completely ignored the subsequent revisions of such genera by other systematists. No adequate reason has been offered for this arbitrary innovation, except that it will relieve those who adopt it from the trouble of acquainting themselves with the work of previous writers. Apart from the hopeless confusion in zoological nomenclature that would result from the general adoption of such a system, it is so obviously unjust that it is not likely to find acceptance among scientific men.

The Rev. F. D. MORICE remarked that the Honey-bee had been accepted by all authors as the typical *Apis* of Linné, but that the first species standing under *Apis* in the "Systema" (Ed. X) was not the Honey-bee, but what we now know as *Eucera longicornis*, L. Also, that the first species described in the same work as a *Sphex* was an insect from Surinam, which the author certainly would not have selected as his "type," since in Ed. XXI he removed it from *Sphex* altogether, and placed it in *Apis*! Again, the first species described by Linné under *Formica* was not what all authors now call a *Formica*, but a *Camponotus*. He felt sure that, whatever might be the case as to other groups, no workers on the Hymenoptera had yet adopted or were ever likely to adopt a principle which involved such consequences.

The PRESIDENT, taking part in the discussion, said he did not agree with some of the remarks that had been made in reference to Sir George Hampson's motive in adopting the principle of selecting the first species as the type of the genus, for he thought Sir George was firmly persuaded that his was the only method capable of leading to stability in nomenclature, and that the rest of the zoological world would finally be converted to his way of thinking. He had much sympathy with the contention that his method would save an immense amount of time spent in bibliographical research. Had that method been acted upon from the first, it would, no do[illegible] have simplified procedure and placed nomenclature on a firmer basis. But Sir George had come into the world a century and a half too late. His mission should have commenced with Linnæus himself, with his pupil Fabricius, and the other entomologists of the time, not one of whom entertained the idea of fixing the first species as the type of the genus. As a member of the International Committee on Entomological Nomenclature, he had recently been asked for an opinion on the disputed question of the geno-type of *Cimex*, Linn., and in endeavouring to arrive at one that would be in accord with the rules of the International Code, he met with difficulties of various kinds. But this, he thought, was a very exceptional case, and the chief difficulties he found in dealing with it, were the result of the arbitrary action of one or two of the older authors, who refused to accept the *fait accompli*, and proceeded to undo the work already done. Theirs was the kind of action which Sir George Hampson would like to see followed at the present day. It had only led to the confusion and the waste of time, which he deplores, and even if we had no moral obligation to the workers of the past, the great inconvenience for zoologists in every branch which would result from adopting his principle and applying it to the genera of the older authors, ignoring all that has been done in the meantime and treating the writings of our predecessors as so many scraps of paper, condemns it at once as preposterous and absurd. He had been looking up some others of the genera, besides *Tinea,* in the 10th Edition of the "Systema Naturae," to see what changes would follow if Sir George Hampson's method were to be adopted. *Cerambyx,* which gives its name to a family of Longicorns, and is now applied to a genus of well-known European species, would be given instead to the Harlequin-beetle, which is a native of tropical America and belongs to another family. The name *Leptura,* with *L. aquatica* as the type, would be transferred from the flower-frequenting group of Longicorns known as the Lepturidae, and given instead to a group of sub-aquatic Phytophaga. The glow-worm would lose the name of *Lampyris noctiluca,* to be known henceforth as *Cantharis noctiluca,* with a corresponding change in its family name. It would be wrong in future to refer to the common house-fly as *Musca domestica,* or to place it in the family Muscidae; the latter name should be reserved for the Hover-flies, which we now call *Syrphidae.* One had only to think for a moment what hundreds of changes of this kind would involve, not merely in systematic writings, but in literature of an economic or more general character, in order to see how hopeless is the prospect of getting a majority to adopt the method which would bring them about. The number of genera whose types cannot easily be determined in accordance with the rules laid down in the International Code of Zoological Nomenclature was surely not so great that we must be prepared to face the revolutionary alternative which Sir George Hampson so persistently places before us, and to which he adheres in his own writings in spite of the protests of almost every one of his fellow-workers in entomology. It was to be hoped that he would be led by the views expressed that evening to reconsider his position, and that he would fall into line on the subject of nomenclature with the systematists of his own and of every other country.

Mr. DURRANT remarked that the present discussion really resulted from the action of the Zoological Society in refusing as unjustifiable and *ultra vires* an attempt to change the familiar and world-wide application of the generic name *Tinea* of Linné—to remove this name from the clothes-moths and transfer it to the honey-moths (*Galleriadae*), with which it had never been specially associated. This would involve not only the change of generic names but also of the higher groups, *Tineina, Tineidae* and *Galleriadae,* the only grounds for the change being the numerical sequence of species in the series. The system was founded on a total disregard of all systematic or critical work done after the original publication of a generic name, and the result would be to cancel everything that had been done, and to say that all work was wrong unless the first species had been selected as the type. The adoption of Sir George Hampson's sytem would involve the change of every familiar generic name, unless by chance the first species had been constituted the type by earlier authors. Nothing could be gained by such alterations except uniformity of treatment in one series of volumes to which no one else but the author was committed.

Years ago Sir George Hampson started a correspondence on this subject with the following letter:—

"*British Museum* (*Natural History*),
"*Sept. 12th*, 1896.

"Dear Sirs,

"As there is a probability of a new British Museum descriptive Catalogue of all the described species of *Heterocera* being shortly commenced it is thought advisable to consult a certain number of the best-known authors on the *Lepidoptera* as to the system of nomenclature which is to be adopted. With this object in view the enclosed list of questions is sent to you, and if you will be good enough to express your views on the subject they will be of great assistance in forming the scheme of the work, and perhaps contribute to attaining a more uniform system of nomenclature in the *Lepidoptera.*

"The names selected for consultation are :—Prof. Scudder, Prof. Fernald, Prof. J. B. Smith, Dr. Staudinger, Herr P. C. T. Snellen, Prof. Aurivillius, Prof. A. R. Grote, Lord Walsingham, E. Meyrick, Esq., W. F. Kirby, Esq., and Sir G. F. Hampson.

" Other names might easily have been added to this list, but it was thought that eleven would constitute a more manageable committee than a larger number would, and those selected sufficiently represented the various opinions on the subject and the countries most interested in the *Lepidoptera*.

" It is proposed to circulate the papers once for you to give your opinions, and then again for you to see the answers given and make any additional remarks that strike you.

" I am, dear Sirs,

" Yours faithfully,

" G. F. HAMPSON."

Question 7 was: " By what process is the type of a hetero-typical genus to be ascertained ? " and a special question under this heading was: " *c*. What is the type of *Tinea*, L. ? "

On Sir George Hampson's suggestion that " the first species, or the first species agreeing with the description, to be considered the type," the opinions were :—

For: 1, Hampson; 2, Staudinger.

Against: 1, Aurivillius; 2, Fernald; 3, Grote; 4, Kirby; 5, Meyrick; 6, Scudder; 7, Smith; 8, Walsingham.

[Snellen stood alone in totally rejecting " le système des types génériques."]

And on the question: " *c*. What is the type of *Tinea*, L. ? " there were in favour of *pellionella*, L. (an ordinary clothes-moth): 1, Walsingham; 2, Meyrick; 3, Kirby; 4, Fernald; 5, Smith; 6, Aurivillius; 7, Grote (8, Scudder and 9, Staudinger assumed to concur).

While Sir George Hampson was unable to say which was the first species that agreed with the description, after having wrongly cited as the type *gelatella*, L. (a species which did not occur in the 10th edition of Linné).

Sir George Hampson has rightly accepted as the type of *Sphinx* the *seventh* species *ligustri*, which Linné states in the Fauna Gnecica was " Vulgo *Sphinx*," and also as the type of *Bombyx* species 18 *mori* " Vulgo *Bombyx* " according to Linné.

It is therefore evident that the first species included in a genus by Linné was not necessarily the type—indeed, in Phil. Bot. (ed. 1), 197 (1751) and (ed. 2) 201–2 (1763), Linné himself wrote: "Si genus receptum, secundum jus naturae et artis, in plura dirimi debet, tum nomen antea commune manebit vulgatissimae et officinali plantae," showing that his opinion was that the name should be restricted to the best-known species—not the first on the list.

The whole question was thoroughly threshed out in 1896–1898, and a full report with analyses of replies to the questions circulated will be found in Proc. IV, Int. Congress Zool., 273–342, Cambridge, 1899.

Mr. Durrant concluded by remarking that nothing new was being brought before us, and he had dealt with the whole question twenty years ago!

Dr. G. A. K. Marshall then proposed the following Resolution:—

"That in the opinion of this Society the arbitrary method followed by Sir George Hampson of taking as the Type of a Genus the first species in the series, disregarding the work of previous authors, is contrary to the usage of Entomologists, and this Society declines to adopt this system."

Mr. G. T. Bethune-Baker spoke as follows:—

In seconding the motion I would draw your attention to the fact that the proposition of Sir George Hampson to adopt the first species as the type has been discarded practically by all authors of zoology everywhere. Sir George claims Rothschild and Jordan as adherents to his method, and in their great work on the Sphingidae it is true they did adopt that method, but they have discontinued it and do not adopt it now. Again, Barnes and McDunnough, who at first thought it was a *convenient* arrangement, have likewise discarded it, finding, as they say, the whole of the zoological world against them. Even Sir George himself makes his own exceptions (Novit. Zool., xxiv, p. 19; 1917), to wit, *Tortrix* with *viridana* as the type, the second species; *Sphinx* with *ligustri* as the type, because of the sphinx-like attitude of the larva; *Bombyx* with *mori* as type. He gives his reasons, it is true, but similar reasoning ought to apply with equal force to the genus *Tinea*, for I demur entirely to his statement that *pellionella* when at rest folds its wings in a tent-like shape.

Sir George's suggestion that most of the authors in "Seitz" and most of the American authors adopt this principle simply made me gasp with surprise; whether at the time of the initiation of this, at the Cambridge Congress, the American authors adopted the principle I do not remember exactly; I doubt it; but to-day there is no question that they do not do so, and looking over my "Seitz" again I really do not see any justification for the remark. One or two do so, but the bulk of the authors act quite independently of the method, taking the first species in some cases but not in others. Further than this, the injustice of the thing is apparent on the face of it. Why should we at this late date take upon ourselves to ignore all the revisionary work of earlier students?

Sir George would scrap the work of all revisers if they did not adopt his pet theory; we might quite as well adopt as a working principle the suggestion that all descriptions should be ignored if a figure was not published with the description or shortly after.

Instead of coming rapidly into general use, as Sir George thinks, it has gone rapidly out of use. It never had general acquiescence, and to-day in all branches of zoology it is discarded by the great majority of workers, and I can only hope that Sir George will see that he stands practically alone in his idea, and that he will soon leave that solitary position.

Mr. T. Iredale, who was present as a visitor, spoke regarding Sir G. Hampson's contention that this principle (the first-species rule) was accepted by a majority of workers in other classes, and as regards ornithology and conchology denied that it had any adherents at all. Some years ago the American Ornithologists' Union debated the subject and inclined to accept the first-species rule, and advised to that effect. The result, however, was that immediately the advice was repealed, as it was proved that confusion would ensue, without prospect of later stability. It might be further added that even when the matter was under discussion it was agreed by all workers that the Linnean genera must be excepted, as it was a known fact that the first species in Linné's system was generally atypical and that the central one was commonly the typical species. No exact law as we understand laws was followed by early writers and many ranged their species alphabetically, and moreover in such cases examples cited were not displayed for generic characters, but on account of their beauty, size, or similar object. As regards conchology, the first-species rule has never been absolutely accepted, though seventy years ago it was a custom *when other methods failed* of accepting the first species *arbitrarily* as type. At the present time certainly no systematic worker in either group transgresses the Laws of the International Congresses as regards type selection, nor is there any reason to suspect any difference of opinion as to the results to be achieved by the continuance of such acceptance.

The Resolution was then put to the meeting and carried unanimously.

THE ANNUAL MEETING.

The Annual Meeting took place on Wednesday, January 16th, 1918, Dr. C. J. Gahan, M.A., D.Sc., President, being in the Chair.

Mr. W. G. Sheldon, one of the Auditors, read the Treasurer's statement of Accounts, which was adopted on the motion of Mr. Stanley Edwards, seconded by Mr. Frisby.

The Rev. G. Wheeler, one of the Secretaries, then read the following

Report of the Council.

The Society has during the past year felt in many directions the pressure of the war to a much greater extent than had previously been the case. Although the attendance at the meetings in the early part of the year was as large as could be reasonably expected, yet, owing possibly to air-raids, there were less than twenty present at either of the October meetings; there has, however, latterly been a marked improvement in attendance, and at the December meeting the numbers only fell just short of fifty. The standard of interest of the meetings has, however, been well kept up, although, as usually occurs, there have been one or two meetings when a larger number of exhibits would have been welcome.

With regard to numbers we are again somewhat reduced. While twenty new Fellows have been elected we have lost eight ordinary Fellows by death, nine by resignation and nine by removal of names for non-payment of subscription, the latter including the eight enemy aliens whose names were still upon the list. We have also lost one Honorary Fellow by death, viz. Dr. Emil Frey-Gessner of Geneva, whose place has not yet been filled up. The Council has also again to regret the loss of one of its members in the death of Mr. A. E. Gibbs, shortly after his re-election. It would be impossible to pass over the death of Mr. Gibbs without a tribute to his usefulness both on the Council and more especially on the Business Committee of which he had been for five years a most valued member.

The Society now consists of eleven Honorary and two special Life Fellows, together with five hundred and eighty-six ordinary Fellows making a total of five hundred and ninety-nine.

In consequence of the great shortage of labour in the printing trade, as in all others, considerable delay has been experienced in the production of the Transactions. This fact combined with the enormous increase in the price of paper has made it necessary this year to produce Parts II, III and IV together, both with a view to economy and also to make it possible for the future to publish Parts I–IV as nearly as may be within the year for which they are dated. The volume for 1917 will consist of 405 pages illustrated by one chromo-lithograph, six 3-colour plates, fifteen half-tones, one line block and one sketch-map, twenty-four plates in all. Sir George Kenrick bears the cost of the 3-colour plates. The papers are thirteen in number by the following authors:—Messrs. R. S. Bagnall, F.E.S. (in conjunction with Dr. J. W. H. Harrison, D.Sc.); G. T. Bethune-Baker, F.L.S., F.E.S.; G. E. Bodkin, F.Z.S., F.E.S.; P. A. Buxton, B.A., F.E.S., M.R.C.S.; G. C. Champion, A.L.S., F.Z.S.; Dr. T. A. Chapman, M.D., F.Z.S., F.E.S.; Dr. E. A. Cockayne, M.A., M.D., F.E.S., etc.; Dr. H. Eltringham, M.A., D.Sc., F.E.S.; Dr. J. W. H. Harrison, D.Sc. (in conjunction with Mr. R. S. Bagnall); O. E. Janson, F.E.S.; Sir George H. Kenrick, Bart., F.E.S.; E. Meyrick, B.A., F.R.S., F.E.S.; Rowland E. Turner, F.Z.S., F.E.S.; and C. B. Williams, M.A., F.E.S. Of these, eight refer to Lepidoptera, two each to Coleoptera and Hymenoptera, and one to Diptera. The Proceedings will consist of about one hundred pages illustrated by nine half-tone plates and several text-figures; the cost of two of the plates is borne by the Rev. F. D. Morice.

At a Special Meeting held on Jan. 7th, the Council drew up and forwarded to the Prime Minister the following protest against the proposal of the Government to commandeer the Natural History Museum:—

"This Society, founded for the advancement and practical application of Entomological Science, knowing that this

Science, especially at the present moment, plays a most important part in many questions, often of extreme urgency, affecting the health of the Nation and its forces at home and abroad, its food supplies, its timber, and the raw material of its manufactures, views with the gravest concern any action that would impede work essential to the National welfare.

"Such work includes :—

"(1) The investigation into the relation between insects and the spread of such deadly diseases as typhus, plague, malaria, yellow fever, sleeping sickness, etc., to which our troops are exposed in various parts of the world.

"(2) The prevention of the attacks of innumerable insect pests upon every kind of food crop, whether growing, in transit, or in storage, by which the available supplies are very materially reduced, and occasionally even totally destroyed.

"(3) The protection of timber, cotton, and other raw materials essential to the conduct of the war, from the many pests that attack them.

"Towards the solution of these problems the collections at the Museum have in the past largely contributed, and many of them are at present under investigation.

"The proposed action of His Majesty's Government in reference to the Natural History Museum, would have a disastrous effect upon work which demands continual reference to its enormous collections. It is obvious that to be of any practical value these must always be readily available, and moreover their removal would not only be a very lengthy undertaking, but could not be carried out without irreparable damage.

"The Entomological Society of London feels bound therefore to enter the strongest possible protest against such proposed action, the full consequences of which can hardly have been realized, and in the interests of the Empire urges that the suggested interference with these important collections should be abandoned.

"Signed on behalf of the Council,

"G. B. Longstaff, Vice-President."

The Council desires to express its great regret at the retirement of the Treasurer in consequence of ill-health, and also its appreciation of his services for the past fourteen years, which have been invaluable.

The TREASURER reports as follows :—

" The accounts compare favourably with those of last year. There was then an estimated liability of £294 against a balance of £237 14*s*. 9*d*., whereas this year the estimated liabilities are about equal to the balance. There is a falling off of £44 12*s*. in the amount received for Subscriptions compared with 1916; but the arrears received (£45 3*s*.) are in excess by £18 18*s*. There are no other items which call for comment with the exception of the ' Subscriptions in arrear.' Hitherto the return has been made for those ' considered good.' Under present conditions it is impossible, with any degree of certainty, to separate the ' good ' from the ' bad '; I have therefore returned the total amount of the indebtedness, viz. £232 1*s*. A considerable portion of this sum is merely in abeyance during the war, being subscriptions unpaid meanwhile by Fellows serving at the Front.

" I much regret my inability to continue my Treasurership, and I thank the Society for the confidence reposed in me during the time I have had the honour to act as their Treasurer, and I take this opportunity of thanking my Colleagues and the Fellows generally for their unqualified courtesy shown me during my term of office.

" The Society, I consider, may be congratulated upon obtaining the services of Mr. W. G. Sheldon as my successor.

" A. HUGH JONES."

The LIBRARIAN reports as follows :—

" Three hundred and fourteen volumes have been issued from the Library for home reading. Eighteen volumes and a large quantity of Separata have been presented to the Library. As was the case last year, very few foreign periodicals are coming to hand. The Library has been well used for purposes of reference."

The Report was adopted on the motion of Mr. O. E. JANSON, seconded by the Rev. F. D. MORICE.

No other nominations in addition to those of the Council having been received, the President declared the following

Fellows to have been duly elected as Officers and Members of Council for the ensuing year :—

President, Dr. J. C. GAHAN, M.A., D.Sc. *Treasurer*, W. G. SHELDON. *Secretaries*, Comm. JAMES J. WALKER, M.A., R.N., F.L.S.; Rev. GEORGE WHEELER, M.A., F.Z.S. *Librarian*, GEORGE CHARLES CHAMPION, F.Z.S., A.L.S. *Other Members of Council*, A. W. BACOT; E. C. BEDWELL; K. G. BLAIR, B.Sc.; Dr. T. A. CHAPMAN, M.D., F.Z.S.; W. C. CRAWLEY, B.A.; H. WILLOUGHBY ELLIS, F.Z.S.; Dr. H. ELTRINGHAM, M.A., D.Sc., F.Z.S.; J. C. F. FRYER, M.A.; A. HUGH JONES; Rev. F. D. MORICE, M.A.; S. A. NEAVE, M.A., B.Sc., F.Z.S.; HERBERT E. PAGE.

The PRESIDENT then delivered an Address, after which Mr. SIMES proposed a Vote of Thanks to him which was seconded by Dr. ELTRINGHAM; the President in returning thanks spoke of the neglect of the Biological Sciences on the part of the Government.

Mr. COLLIN then proposed a Vote of Thanks to the Officers which was seconded by Mr. DONISTHORPE, both of whom made special allusion to the regret felt by the Society at the retirement of Mr. Jones from the Treasurership, after so long a period of very efficient work in the Society's interests.

The two SECRETARIES said a few words of thanks, the TREASURER and the LIBRARIAN being absent.

ENTOMOLOGICAL SOCIETY OF LONDON.

Balance Sheet for the Year 1917.

RECEIPTS.	£	s.	d.	PAYMENTS.	£	s.	d.
Balance in hand, 1st Jan., 1917	237	14	9	Printing Transactions, etc.	249	13	6
Subscriptions for 1917 ...	390	12	0	Plates, etc.	58	15	1
Arrears	45	3	0	Rent and Office Expenses	200	17	10
Admission Fees	25	4	0	Books and Binding	18	0	8
Donations	14	11	2	Purchase of Books for Library, including binding Mrs. Meldola's grant as per contra	31	10	0
Sales of Transactions ...	141	9	10	Subscriptions in Advance as per contra carried to 1918	15	15	0
Interest on Investments— Consols ... £25 8 0; Birmingham 3 per cents. 5 7 10	30	15	10		574	12	1
Income tax recovered on above until 5th October, 1917	15	7	3	Balance in hand	382	17	10
(*Note.*—The Bank of England will in future pay the dividend in full on the above.)							
Interest on Deposit ...	6	7	1				
Grant from Mrs. Meldola as per contra	31	10	0				
Subscriptions in Advance	15	15	0				
	£957	9	11		£957	9	11

ASSETS.	£	s.	d.
Subscriptions in arrear ...	232	1	0
(*Note.*—This sum includes *all* subscriptions to date unpaid. A large proportion of these are in abeyance during the War by Fellows serving at the Front.)			
£1,354 2*s.* 2*d.* Consols. Original cost £1,233 3*s.* Present value at the price of 54½ on the 31st December, 1917	737	19	10
£239 12*s.* 4*d.* Birmingham 3 per cents. Original cost £250. Present value at the price of 59 on the 31st December, 1917	141	7	5
Balance in hand	382	17	10
	£1,494	6	1

Additional Assets:—
Contents of Library
Valued at, say, £3,800.

ESTIMATED LIABILITIES.

Cost of printing Parts 1 to 5 estimated at the cost of Parts 1 to 5 for 1916, say, £364. Estimated cost of Plates in hand, say, £18, making a total liability of, say, £382, against the balance of £382 17*s.* 10*d.*

Audited, compared with vouchers and found correct, 9th January, 1918—

W. G. SHELDON.
H. WILLOUGHBY ELLIS.
S. A. NEAVE.
A. BACOT.
K. G. BLAIR.

The value of Securities shows a total depreciation of £603 15*s.* 9*d.*

A. HUGH JONES, *Treasurer.*
9th January, 1918.

THE PRESIDENT'S ADDRESS.

Gentlemen,

You have just heard the Report of the Council, and I think you will agree that the state of affairs which it discloses in reference to the general progress of the Society and its present financial position is one with which we have no reason to be dissatisfied. Our meetings have been attended even better than one could have expected considering the eventful nature of the times through which we have been passing. The subjects discussed and the exhibits shown have continued to be as interesting as ever. We have had no lack of valuable papers, although you may probably find the volume of Transactions for the past year not quite so bulky as some of those for preceding years; but in their decision to limit its size the Council have been influenced not so much by financial considerations as by a desire to return to the old and well-approved practice of issuing the first four Parts within the year whose date they bear. That practice seems to be in every way desirable; it helps to make the financial situation more easily understood; and it has decided advantages for the systematist by saving him the trouble of giving double dates in his references. It was insisted on in the days when for a short period I was one of the Secretaries, and I remember well the anxious moments we used to have towards the end of the year for fear that Part IV would not be ready for issue before the 31st of December. Knowing some of the difficulties with which the Secretaries have to contend, I should like to remind Fellows of the Society that when they contribute to the Transactions, exhibit specimens, or speak at the meetings they can, if they will only take the trouble, make the work easier for them.

In addition to the mention of Fellows who have died during the year, the Report of the Council relates to one other matter which can only be a source of the greatest regret. Needless to say, I refer to the resignation from office of our worthy Treasurer. He has for so long a time, and with such great care and success, looked after the financial affairs of the Society, that it owes him a debt it can never expect to repay. But if gratitude to him for his services can help to wipe out the debt, he may rest assured that he has it in full measure.

The Fellows of the Society who have died in 1917, fortunately not a very large number, include Dr. Emile Frey-Gessner, an Honorary Fellow; Charles Owen Waterhouse, a former President; Arthur Ernest Gibbs, who was a member of the Council, and six other Fellows.

Dr. Frey-Gessner had a deservedly high reputation as an Entomologist both here and abroad, and although I had not the good fortune to know him personally, I understand that he was very popular with his fellow-workers on the Continent. He was elected an Honorary Member of the International Congress of Entomology at the meeting held in Oxford in 1912, and in the same year was elected an Honorary Fellow of this Society. Born in Canton Aargau, he began collecting Swiss insects of all kinds at an early age, chiefly for Drs. Imhoff and Schmidt of Basel. Though his own tastes were at first directed towards the Orthoptera, they were gradually transferred to the Hymenoptera. His monograph of the Swiss bees (Hymenoptera Helvetica, Apidae), which was completed only a short time before his death, is considered by competent judges to be a very thorough one. He had a general knowledge of exotic insects, but devoted himself chiefly to the insects of the Swiss fauna; and his collections, which are entirely Swiss, are now mostly in the Bern Museum, while some are at Geneva.

Charles Owen Waterhouse was the eldest son of George R. Waterhouse, who was one of the original members of this Society, and also at one time President; so that his name has always been closely connected with the Entomological Society of London and carries us back to the days of its foundation.

It is associated also with the names of Charles Darwin and Richard Owen, intimate friends of his father; so that his brother-Entomologists might feel almost disposed to envy him the advantages to which he was born, and which also he must have derived in his early days from contact with such distinguished naturalists. But if those advantages are to be held accountable in any way for the great interest he took in Entomology and the work he has done in its service, this Society may claim to have received some benefits from them. He had been for forty-eight years a Fellow, and for two years (1907–8) President of our Society, served at different times on the Council, rarely missed attending our meetings, and the mere titles of the papers which he contributed to our Transactions help to fill more than one page in the Catalogue of our Library. As he was personally familiar to most of you, and you have had many opportunities of knowing how wide and intimate was his knowledge in almost every branch of Entomology, it will be easy for you to understand how highly I appreciated him, and how grateful I feel, having been associated with him so long, for the assistance he was always so ready to give, especially in the days when, almost a novice in Entomology, I began to work on beetles in the British Museum. At that time, although I had a good knowledge of biology, the result of two years' steady work under Prof. Huxley in his laboratory at South Kensington, I knew comparatively little about insects. One of the things, however, which I had studied and thought I knew well was the structure and homology of the mouth-parts of the cockroach. Quite recently, I have been reading a paper by Prof. E. Bugnion upon this very subject, and it has reminded me of a difficulty I had at one time experienced in reconciling various statements about the piece known as the *sub-mentum*. I had been taught to regard this piece as part of the lower lip and homologous with the *cardines* or basal segments of the first maxillae; and this is the view given of it in nearly all of the text-books; but the part which in Coleoptera is known by the same name is merely a continuation of the gula and is so firmly fused with the head capsule that it can only be regarded as a sternal part of the head. I went with this difficulty to Waterhouse, and I am inclined to think that his readiness to help on that occasion was the origin of an investigation in comparative morphology, the result of which he published at his own expense, in a short paper, with coloured plates, entitled "The Labium and Sub-mentum in certain Mandibulate Insects." In this paper he has endeavoured to show, by a comparison of the parts in various forms, that the sub-mentum is, in fact, a part of the head itself and need not be taken into account when homologizing the parts of the labium with those of the maxillae. Owing to the manner of its publication, this paper has, I fear, been almost entirely overlooked, which makes it all the more desirable to call special attention to it here. Prof. Bugnion, without in any way referring to it, takes very much the same view of the sub-mentum as Waterhouse, and supports it by other statements of fact; but as the terminology used by him is not the same, one has to be careful in reading his paper to note exactly what he means by *sub-mentum*. This name he applies to a part of the labium, using the name *basilaire* instead for the part figured and described in most of our text-books as the sub-mentum. Which particular part has the right by priority to the name of *sub-mentum*, I cannot, at the moment, definitely say, but I rather think the name was first made use of in Coleoptera and in the same sense in which it was applied by Waterhouse.

Arthur Ernest Gibbs was another Fellow of the Society who took a great interest in its work; and as a member of the Council and of the Business Committee, as well as in many other ways, rendered it most valuable service. He was an active member also of the South London Entomological and Natural History Society, of which for a time he was Vice-President. He was a keen student of the Lepidoptera, and in his frequent travels on the Continent, and with the aid of collectors in other parts of the world, got together a very considerable collection. He was very much interested also in the local museum near his home at St. Albans, which has benefited largely, I believe, through his generosity. Those of us who have had the pleasure of meeting him frequently and of knowing his kindly disposition will miss him greatly, as indeed will this Society as a whole.

Of the other Fellows who have died, I wish I were able from personal knowledge to say at least a few fitting words. But unfortunately my acquaintance with them was so slight that I should be unable to say more than I could gather from the Obituary Notices which are accessible to all in the Entomological Journals.

At one of our Annual Meetings, the President of the year reminded us that he was not required under any bye-law to deliver a Presidential Address, but he delivered it all the same, and an excellent one it was. If you expect me to continue now and to follow his good example I fear you will be disappointed. A good Presidential Address, such as you have been accustomed to hear at these annual meetings, needs a good deal of preparation and a lot more besides, even if one happen to make choice of an interesting subject. The subject, or rather the mixture of subjects, on which I propose to speak, is, however, not so much a matter of my own choice, as of being compelled to it by the necessities of the case. For I have to admit that so far as preparation is concerned, you may have reason to think that I have been rather neglectful of my duty to you, and the only excuse I can offer, which I trust you will accept, is that, although my intentions were of the best, I have been quite unable to find the time that was needful to fulfil them.

When Mr. Bethune-Baker, in his Presidential Address delivered three years ago, suggested a subject for investigation which, he said, would be of the utmost importance to science, I had a strong inclination at the time to try and act upon it. It appealed to me as a Coleopterist. An investigation of the male genital organs of beetles would, I thought, be of the greatest interest, especially if one could go on to compare them with those of other insects with a view to homologizing the parts. But an investigation of that kind requires time, certainly much more than has been at my disposal from that day to this; and in consequence I have had to abandon the idea. It is, however, a work that should employ many hands, notwithstanding that Sharp and Muir in their invaluable memoir which appeared in our Transactions for 1912 have covered a good part of the ground. That memoir is a veritable storehouse of facts on the subject, and enables us to see almost at a glance the type of structure of the genital tube and its accessories in almost every family of Coleoptera; but it still leaves us without sufficient evidence to judge whether all the conclusions they seem inclined to draw from them are right. The organs they describe are, without doubt, of considerable phylogenetic importance, but whether they have all the importance which they claim for them is another question. To me, at any rate, some of their conclusions seem open to suspicion, especially those which lead them to hint that the Coleoptera are not a monophyletic group of insects, but, starting from some Neuropteroid or other pre-Coleopteran forms, have reached the Coleopterous stage along different lines of descent. We all admit the great importance which the structure of the aedeagus has in enabling us to discriminate between closely allied species in certain genera and in many whole groups, and we know how different it is at times in two species which in all other respects seem to be very closely related. This applies also to the external accessory parts—the parts visible in Coleoptera without dissection—a subject which did not come within the scope of the memoir by Sharp and Muir. An investigation that would enable us to see the whole range of variation and the degree of modification of the genital organs within certain genera or groups of genera in the different families would help us to form an idea of their phylogenetic value, and seems to me to be a great desideratum. But however neglectful the systematists in Coleoptera may have been in the past, signs are not wanting to show that they are now fully alive to the importance of examining these structures, even if only to help them in their ordinary every-day work. And to show that their importance had not been overlooked in the past, I cannot do better than to quote an interesting passage from one of H. W. Bates's papers on the Amazonian Longicorns, a passage which, written for the eyes of the specialist, may not have received the general attention which it deserved. The passage is as follows—

"It is a remarkable circumstance, that in many families of insects which have accessory sexual parts easy of examination, it is found that these differ very considerably in structure in closely allied species. It has been remarked that they offer some of the best characters to distinguish species, and they have been made use of to separate species which scarcely offered any other distinguishable characters. Mr. Baly has also discovered that the horny penis concealed in the male abdomen of Phytophagous Coleoptera differs in form in closely allied species; and he has shown me a long series of specimens mounted for examination under the microscope, belonging chiefly to the genera *Chrysomela* and *Eumolpus*, which offer a most instructive study, since by their means some forms before considered as varieties turn out to be distinct species.

"This class of facts seems to me of great significance, as throwing light on the segregation of varieties and their passage into true species. For if we admit that the only sound difference between allied varieties and allied species is that the former intermarry and the latter do not, then the abrupt and great diversities of structure in those organs most directly involved in the matter must be considered as affording an explanation why many varieties do not intercross with the parent stock and therefore remain as independent forms or species. The difference in the accessory male organs of our two allied species or local forms of *Colobothea* is so great that no one who examines them can believe both to be adapted to the corresponding organs of the females of each form. At the same time I have no doubt that, were it not for the great difference between these organs in our two forms, no entomologist would doubt their being mere local varieties of one and the same stock. Scores of other local varieties occur in the same countries, presenting all the successive steps of segregation, from the most partial variation to the full-formed local race.

"Thus we have only to admit that species disseminate themselves over wide areas, and adjust themselves to the diversities of local conditions, or, in other words, segregate local varieties, to open the way towards an explanation of the way in which the world has become peopled by its myriads of species. The inevitable law of Natural Selection which governs the general process of the adjustment of the local races to new conditions will explain the changes of conditions of life in time; and the laws of variation, diversified in details as are the species themselves, will explain the rest."

Mr. Bethune Baker in his Address had occasion to refer to the genera *Ichthyurus* and *Psalidura*, but he could hardly have suspected how interesting an illustration of the modification of parts those genera afford. *Ichthyurus* is a genus in which I had, myself, previously been very much interested for another reason. It belongs to the family Telephoridae, and several years ago I had discovered in nearly all the beetles of this family a series of small apertures, distinct from the spiracular openings, along the sides of the first eight dorsal plates of the abdomen, a pair to each segment. In some genera they lie well within the lateral margins; in others they are placed close up to, or quite upon, the postero-lateral angles, excepting the first pair, which always retain their position inside the margin of the first tergite; and in a few genera they are situated at the apex of very distinct lateral processes which point outwards and slightly backwards. In appearance these apertures are not unlike some forms of spiracles; each has a circular chitinous rim bordering a small pit lined with a pale membrane in which is a still smaller opening fringed with fine hairs, and which evidently is the external opening of a gland. Segmentally arranged glandular apertures of this kind are known in the larvae of some Coleoptera, Lepidoptera, and other insects, and the secretion is considered to be distasteful and protective. Miss Olga Payne, with whom I was in correspondence when she was working on the structure and life-history of one of our species of *Telephorus*, has found the glands also in the larva of that genus, and in the three thoracic as well as in the first eight abdominal segments, and has given a description of them in a paper since published; but she has expressed a doubt as to whether they are really functional, since the openings were very small and no liquid secretion seemed to come from them. So far, however, as the imago is concerned, there can be no doubt that they are functional; for in handling some living specimens I have myself seen drops of a clear liquid of pretty considerable size issue from the pair of apertures on the eighth segment, and so convinced was I that the secretion serves as a protection to these beetles that I mentioned my own observations in order to confirm the view that they are a distasteful group, when reading a paper on "Mimicry in Coleoptera," since published in the Proceedings of the South London Entomological and Natural History Society. Although many other groups of insects are at least equally distasteful, this is the only one, so far as I know, in which a series of segmentally-arranged glands of the kind described have been met with in the imago. But to return to *Ichthyurus*. In this genus, the apertures of the glands are present as usual, but the last pair, the largest of all, are placed at the end of those strong outwardly and backwardly diverging processes of the eighth tergite, which gives it that fish-tail resemblance from which the name of the genus is derived. It is interesting to think that while I had been looking upon these processes as a battery provided to meet the assault of enemies, Mr. Baker seemed to see in them the arms with which the male is accustomed to embrace the female. But, strange to say, I am not certain that we were not both right. The processes are well developed in all the species of the genus and in both sexes; but they are more fully developed in the male, in which sex also they sometimes have a sharply curved point or tooth at or near the apex, and in such cases the glandular aperture is to be found not quite at the apex, but very near to it. They are in most cases fixed pieces continuous with the rest of the tergite of the eighth segment and only movable with the tergite as a whole, and this is the condition in the species referred to and figured by Mr. Baker. In one species, however, namely *I. apicalis*,* Mots., the male processes take on the form of a pair of forceps, like those of an earwig, with the arms curving inwards and coming in contact behind. Having examined them with a view to finding out whether they were movable from side to side, I found this to be the case, to some limited extent, at least, and that they had all the appearance of being articulated at the base; so it seems to me impossible to doubt that the fixed lateral prolongations of the eighth dorsal plate met with in the other species have here become so far modi-

* = *forcipiger*, Gestro.

fied as to form a pair of appendages adapted to act as clasping organs. They could not have served that purpose from the beginning, but containing, as they still do, the apertures of secretory glands, their development at first may have been to give a more effective use to those glands, and later coming to serve also another purpose their further development may have been in that direction. The genital opening of the male, I may remark, lies just behind the sternite of the segment to which the dorsal processes belong, and is followed by another well-marked sternite which I consider to be that of the ninth segment, though much larger than the corresponding tergite.

There are, as you all probably know well, two principal views as to the origin of the wings in insects, and many advocates of each view. The arguments on both sides are very well set out in a paper on the subject by G. Crampton which appeared in the Journal of the New York Entomological Society in March 1916. The author himself advocates what is, I think, the now generally accepted view, namely that the wings have arisen as out-growths or expansions of the dorsal plates of the meso- and meta-thorax, have gradually developed, and in time became articulated at the base, finally functioning as true wings—that their origin and development was, in fact, very like what we see in the ontogeny of the termites, bugs and other hemimetabolous insects of the present day. To this theory of their origin it has been objected that the wings must have served some use at every stage of their development, and that it is very difficult to understand to what use the notal expansions could have been put which would have caused them to develop an articulation at the base. Crampton effectively replies to this objection by saying: "If an expansion of the integument can acquire an articulation with the body when it develops into a tracheal gill in the water, why can not a similar expansion acquire an articulation with the tergum when it becomes a wing in the air? It is surely no harder to conceive of a rigid outgrowth becoming an articulated appendage in the air, than to conceive of a similar rigid outgrowth becoming an articulated appendage in the water!"

A little further on he gives a few instances to enforce his argument; and in reference to one of these, he says that "On page 242 of his *Cours d'Entomologie,* Latreille, 1831, has described a Coleopteron *Aerocinus* (*sic*) *longimanus,* whose prothorax bears articulated lateral processes (*teste* Cholodkowsky 1886)," and "If these can become articulated to the prothorax without first passing through a tracheal gill stage, why can the wings not do the same? To demand that the wings must pass through a tracheal gill stage in order to become articulated to the tergum, is asking more than the facts would warrant, and in the light of the foregoing instances, this objection to the origin of wings from paranota is not valid." The reference given to Latreille is, however, wrong; for in the work cited Latreille does not even mention the beetle named, though he probably does so elsewhere, as did most of the old authors when pointing out the remarkable character of its prothoracic processes. For example, we find it alluded to in Kirby and Spence's Entomology (Vol. III, p. 538) as follows—

"But the *prothorax* has *movable* as well as fixed appendages; of this kind are those spines (*umbones*) whose base is a spherical boss moving in an *acetabulum* of the thoracic shield of the Capricorn subgenus *Macropus,* Thunb. If I might hazard a conjecture, I should say that these organs were given to this animal by an all-provident Creator, to enable it to push itself forward, when in the heart of some tree it emerges from the pupa, that it may escape from its confinement."

Lacordaire, however, who, in his *Introduction à l'Entomologie* (Vol. I, p. 34, 1834), has also described the movable spines of *Acrocinus longimanus,* gave a different version of their origin: "D'après la loi qui s'oppose à l'introduction d'une pièce nouvelle, cette épine ne peut être qu'une des pièces du prothorax qui a pris une forme insolide, et son analogue doit se retrouver dans tous les autres Insectes; aussi d'après sa situation, pensons-nous que ce n'est autre chose que le trochantin qui a cessé de faire corps avec la hanche, est devenu libre et se portait au dehors, au lieu de rester caché à l'interieur, a pris un développement inaccoutumé. Du reste, l'usage de ce trochantin, ainsi métamorphosé est aussi problématique que celui des cocardes des *Malachius*."

These interesting explanations of the movable spines of *Acrocinus longimanus* should serve to remind us how far from infallible are even the most trustworthy of authorities, and how careful we should be in our statements to make sure beforehand of our facts. Many of you are, doubtless, familiar with the Harlequin-beetle, and know what the truth in regard to its prothoracic spines really is: that they are not in the least movable but are absolutely fixed and as firmly consolidated with the sides of the thorax as the corresponding spines in many other Longicorn beetles. The idea that they were movable arose from superficial observation and was due to the fact that they are surrounded each at the base, but on the upper side only, with a rather deep narrow groove; it began with Linnaeus himself when he described the beetle, and was never questioned until, just about a century later, the mistake was discovered and set right by James Thomson.

Mr. Crampton evidently had no knowledge of that fact, and he is hardly to blame for having accepted as true a statement made on such excellent authority.

But though one of the instances on which he relied is gone, there is no reason why he should not find in the forcipate tail of *Ichthyurus* another that would answer the purpose of his argument almost as well. For if I am right in the interpretation I have given to it, you have there a pair of movable appendages developed from what were once fixed lateral processes, comparable with the prothoracic processes of the Harlequin-beetle.

In the long forcipate tail appendages of *Psalidura*, a genus of Curculionidae, we have another example of perfectly movable structures which have *apparently* developed from fixed rigid processes. I say *apparently*, because, while they are free from the eighth tergite, to which they are attached by membrane on the dorsal side, in one species of a related genus, they seem to be more or less firmly united to the sternal plate on the ventral side. But whether developed as processes from the tergum or from the sternum, it is fairly certain that they have not originated in any other way, and I have little doubt that further investigation amongst the related forms will prove this to be the case.

These remarkable Australian beetles exhibit a great range of modification in the external parts placed near the male genital opening, especially in the structure of the seventh sternite and in the form and degree of development of the forceps, the latter often being provided on the inner ventral side with two blades which sometimes, curving downwards and inwards, come together and overlap so as to form a kind of ring or band, the object of which, so far as one can reasonably infer, is to grip the female right round the hinder end of her body. The characters which these external parts afford have been made full use of by Dr. Ferguson in his revision of the genus; but from what I have seen in the few forms I have had time to examine, I think the aedeagus and other internal structures would well repay, in their interesting modifications, any amount of time spent in investigating them.

Although I have been unable to add more than a very little to our knowledge of the subject, I hope that little will help to show the great interest which an extended investigation of the whole genital apparatus of the Coleoptera must possess, and how completely justified was the opinion expressed by Mr. Bethune-Baker in the Address to which I have referred. I think we may congratulate him also on the happy selection he made when he ventured to illustrate his remarks from examples amongst the Coleoptera.

As a Coleopterist, I have sometimes wished that I could, without too much trouble, make a comparison of the parts in Coleoptera with the corresponding structures in Lepidoptera, and I have turned more than once to look at some of those nice photographic figures with which he and some of his fellow-Lepidopterists illustrate their papers; but I generally fail to comprehend them. I can quite understand that the case would be altogether different if I were experienced in the examination of the parts and knew all about their connections and relative positions. I can understand also that a photograph is more likely to be true to nature than even the best of drawings; but if it teaches less truth what is the advantage? Prof. Huxley, in his *Anatomy of Invertebrate Animals*, says of the male genital armature in the cockroach, that "It consists of a number of chitinous processes having the form of plates and hooks, the exact form and disposition of which could be made intelligible only by numerous figures." There is much point in that statement, which applies as much, I think, to many of the Lepidoptera as to *Blatta*, and I hope my friends will bear it in mind.

Gentlemen, there is another subject on which I should like to offer a few remarks this evening while it is still fresh in your minds, and that is the importance of Entomology in relation to the State. It is a subject in which this Society, if it is to continue true to the aims of its Founders, is bound to take a very deep interest; and, as I need scarcely remind you, it is one on which there are other views than your own. There is, for example, the view which evidently had influenced the Government in their recent proposal to remove the collections from the Natural History Museum and to stow them elsewhere—the proposal against which the Society has strongly protested, and which, if carried out, would almost inevitably have had the effect of interfering greatly with the scientific work of the entomologists of this country, and of bringing to a standstill the valuable and important work that was being done in the interests of the nation by the staffs of the Museum and of the Imperial Bureau of Entomology. Although it is satisfactory to the Society to know that that preposterous proposal has been dropped, the mere fact that it had been entertained by the Government will give you some idea of what value and importance they attach to Entomology. That science has probably formed little or no part of their education, and they cannot be expected to see as clearly as you and I how important is the work done by Entomology, and what great benefit it would be to the State if it were properly encouraged, assisted, and organised in its service. There are many and various ways in which Entomology has already proved itself to be of great use to the State, and the possibilities for the future are also great. This whole subject deserves your serious consideration, and I very much regret that I have not come prepared to deal with it further this evening, but I hope to be able to return to it on some future occasion.

And now, Gentlemen, I must thank you not only for the patience with which you have listened to me to-night, but also for the great indulgence which you have been so ready to extend to me at all times during my past year of office. It is a year that I shall be able to remember always with a deep sense of gratitude to the Fellows of the Society.

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.'

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The Chair will be taken at Eight o'clock.

THE LIBRARY

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