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ENTOMOLOGICAL & NATURAL HISTORY

SOCIETY

1931-32

(Last year's issue should have been 1930-31.)

WITH ELEVEN PLATES
and a Text Figure

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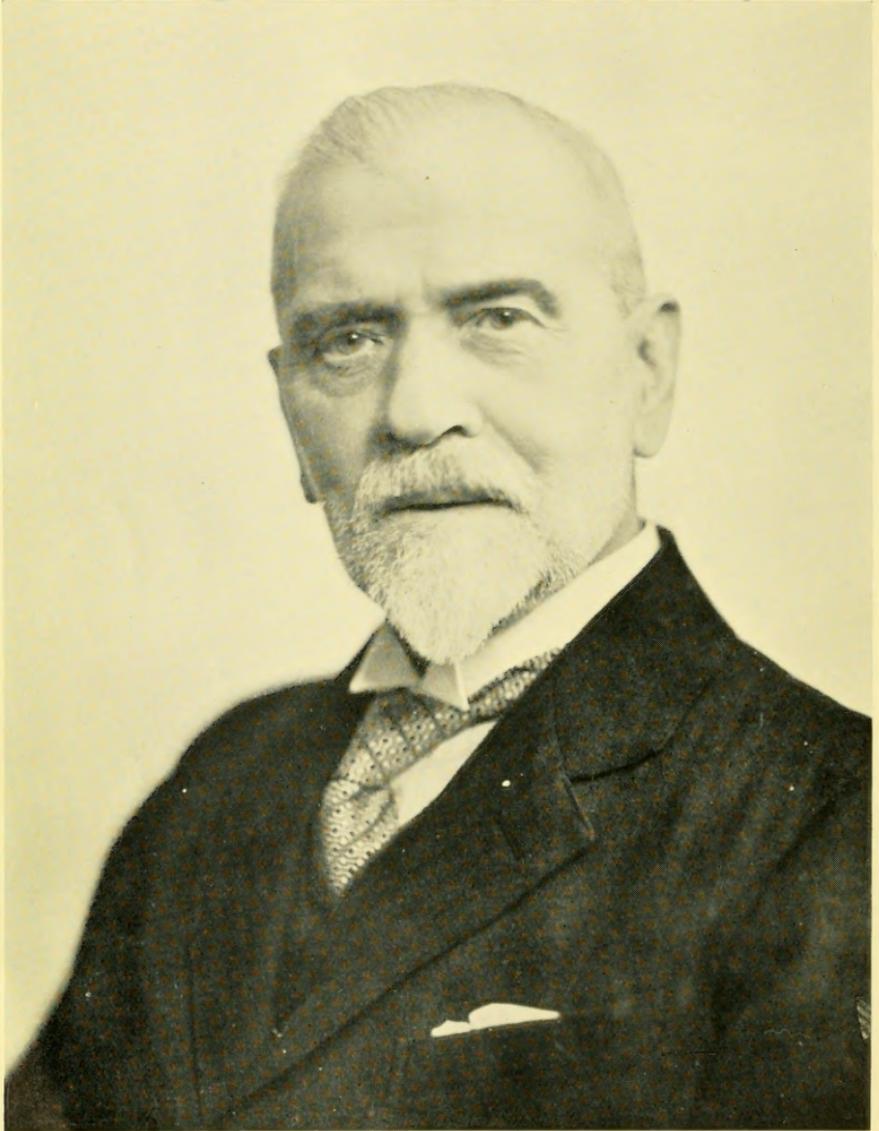


PUBLISHED AT THE SOCIETY'S ROOMS
HIBERNIA CHAMBERS, LONDON BRIDGE, S.E.

PRICE TWELVE SHILLINGS AND SIXPENCE.

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THE SOUTH LONDON Entomological & Natural History Society

(Established 1872)

HIBERNIA CHAMBERS, LONDON BRIDGE, S.E. 1.



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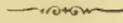
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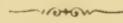
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AUG 5 1932

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Chief subjects of Study :—*h*, Hymenoptera ; *o*, Orthoptera ; *he*, Hemiptera ; *n*, Neuroptera ; *p*, Paraneuroptera ; *c*, Coleoptera ; *d*, Diptera ; *l*, Lepidoptera ; *ool*, Oology ; *orn*, Ornithology ; *r*, Reptilia ; *m*, Mollusca ; *cr*, Crustacea ; *b*, Botany ; *mi*, Microscopy ; *ec. ent.*, Economic Entomology ; *e*, signifies Exotic forms ; *trich*, Trichoptera.



YEAR OF
ELECTION.

- 1886 ADKIN, B. W., F.E.S., "Highfield," Pembury, Tunbridge Wells. *l, orn.*
- 1922 ADKIN, J. H., *Hon. Lanternist*, Lamorran, Oak Lane, Sevenoaks. *l.*
- 1882 ADKIN, R., F.E.S. (*Hon. Member*), "Hodeslea," Meads, Eastbourne. *l, ec. ent.*
- 1901 ADKIN, R. A., "Hodeslea," Meads, Eastbourne. *m.*
- 1930 ALEXANDER, O. A., 23, New Cavendish Street, W.1. *l.*
- 1928 ANDERSON, C. D., 22, Mount Park Road, Ealing, W.5.
- 1907 ANDREWS, H. W., F.E.S., *Vice-President*, "Woodside," 6, Footscray Road, Eltham, S.E. 9. *d.*
- 1901 ARMSTRONG, Capt. R. R., B.A., B.C. (Cantab), F.R.C.S., F.R.C.P., F.E.S., 3a, Newstead Road, Lee, S.E.12. *e, l.*
- 1895 ASHBY, S. R., F.E.S., *Hon. Curator*, 37, Hide Road, Headstone, Harrow. *c, l.*
- 1931 ATTWOOD, R. W., 36, Tannsfield Road, Sydenham, S.E.26.
- 1930 AUBERTIN, Miss Daphne, F.E.S., British Museum (Nat. Hist.) Cromwell Road, S. Kensington, W.7.
- 1931 BALLARD, F., 40, Albert Road, Kingston-on-Thames.
- 1896 BARNETT, T. L., "The Lodge," Crohamburst Place, Upper Selsdon Road, S. Croydon. *l.*
- 1887 BARREN, H. E., 78, Lyndhurst Road, Peckham, S.E. 15. *l.*
- 1930 BARTER, G. L., 50, Wroughton Road, Clapham Common, S.W. 11.
- 1927 BEDWELL, E. C., F.E.S., 54, Brighton Rd., Coulsdon, Surrey. *c.*
- 1929 BELL, J. K., F.E.S., Marden Lodge, Caterham Valley, Surrey.

YEAR OF
ELECTION.

- 1924 BIRD, Miss F. E., "Red Cottage," Cromwell Avenue, Billericay, Essex. *orn.*
- 1911 BLAIR, K. G., B.Sc., F.E.S., *Vice-President*, "Claremont," 120, Sunningfields Road, Hendon, N.W. 4. *n, c.*
- 1898 BLISS, Capt., M. F., M.C., M.R.C.S., L.R.C.P., F.E.S., Butlin's Hill, Braunton, near Rugby. *l.*
- 1926 BLISS, A., 4, Monahan Avenue, Purley.
- 1925 BLYTH, S. F. P., "Cleveland," Chislehurst, Kent. *l.*
- 1923 BOUCK, Baron J. A., F.E.S., "Springfield," S. Godstone, Surrey. *l.*
- 1909 BOWMAN, R. T., "Rockbourne," Keswick Road, Orpington, Kent. *l.*
- 1909 BRIGHT, P. M., F.E.S., "Nether Court," 60, Christchurch Road, Bournemouth. *l.*
- 1927 BROCKLESBY, S. H., "Long Lodge," Merton Park, S.W.19. *l.*
- 1923 BROCKLEHURST, W. S., "Grove House," Bedford. *l.*
- 1924 BROOKE, Mrs. M. L., cf. Dr. C. O. S. Brooke, "Danesmere," Rosetta Avenue, Belfast. *l.*
- 1930 BROOKE, Miss W. M. A., cf. Dr. C. O. S. Brooke, "Danesmere," Rosetta Avenue, Belfast. *ec, ent, b.*
- 1909 BUCKSTONE, A. A. W., 5, Haynt Walk, Merton Park, S.W. 20. *l.*
- 1927 BULL, G. V., B.A., M.B., *Council*, "White Gables," Sandhurst, Kent. *l.*
- 1915 BUNNETT, E. J., M.A., 72, Colfe Road, Forest Hill, S.E. 23. *mt.*
- 1922 BUSHBY, L. C., F.E.S., 11, Park Grove, Bromley, Kent. *c, het.*
- 1922 CANDLER, H., "Broad Eaves," Ashted, Surrey. *l, orn, b.*
- 1899 CARR, Rev. F. M. B., M.A., L.Th., Ditton Vicarage, Widnes, Lancs. *l, n.*
- 1924 CHAPMAN, Miss L. M., "Arolla," Waterlow Road, Reigate.
- 1922 CHEESEMAN, C. J., 100, Dallinger Road, S.E. 12. *l.*
- 1879 CLODE, W. (*Life Member.*)
- 1915 COCKAYNE, E. A., A.M., D.M., F.R.C.P., F.E.S., *Council*, 116, Westbourne Terrace, W. 2. *l.*
- 1930 COLBY, F. E. A., F.R.C.S., "Meadow Cottage," White Rose Lane, Woking.
- 1899 COLTHRUP, C. W., 68, Dovercourt Road, E. Dulwich, S.E. 22. *l, ool, orn.*

YEAR OF
ELECTION.

- 1928 COMMON, A. F., "Tessa," St. James Avenue, Thorpe Bay.
- 1907 COOTE, F. D., F.E.S., 32, Wickham Avenue, Cheam, Surrey.
l, b.
- 1919 COPPEARD, H., 26, King's Avenue, Greenford, Middlesex. *l.*
- 1923 CORK, C. H., 11, Redesdale Street, Chelsea, S.W. 3. *l.*
- 1919 CORNISH, G. H., 141, Kirkham Street, Plumstead Common,
S.E. 18. *l, c.*
- 1922 COUCHMAN, L. E., c/o Mrs. A. Couchman, May Cottage,
Brooklane, Bromley, Kent. *l.*
- 1909 COULSON, F. J., *Council*, "Burnigill," 24, Springfield Road,
Merton Park, S.W.20.
- 1911 COXHEAD, G. W., 45, Leicester Road, Wanstead, E. 11.
(*Life Member.*) *c.*
- 1899 CRABTREE, B. H., F.E.S., "Holly Bank," Alderley Edge,
Cheshire. *l.*
- 1918 CRAUFURD, Clifford, "Dennys," Bishops Stortford. *l.*
- 1920 CROCKER, Capt. W., Constitutional Club, E. Bexley Heath.
l.
- 1898 CROW, E. J., 70, Hepworth Road, Streatham High Road,
S.W. 16. *l.*
- 1928 CURWEN, Capt. B. S., 9, Lebanon Pk., Twickenham. *l.*
- 1927 DANBY, G. C., 33, Huron Road, Tooting Common, S.W.17.
- 1925 DANNATT, W., "St. Lawrence," Gaibal Road, Burnt Ash,
S.E. 12. *l.*
- 1900 DAY, F. H., F.E.S., 26, Currock Road, Carlisle. *l, c.*
- 1889 DENNIS, A. W., *Council*, 56, Romney Buildings, Millbank,
S.W.1. *l, mi, b.*
- 1930 DENVIL, H. G., 54, Malvern Road, Thornton Heath. *l.*
- 1918 DIXEY, F. A., M.A., M.D., F.R.S., F.E.S., Wadham College,
Oxford. *Hon. Member.*
- 1901 DODS, A. W., 88, Alkham Road, Stamford Hill, N. 16. *l.*
- 1921 DOLTON, H. L., 36, Chester Street, Oxford Road, Reading. *l.*
- 1930 DOWNES, J. A., 5, Trinity Road, Wimbledon, S.W.19. *l.*
- 1930 DUDBRIDGE, B. J., 13, Church Lane, Merton Park, S.W. 20.
- 1912 DUNSTER, L. E., 44, St. John's Wood Terrace, N.W.3.
l.
- 1927 EAGLES, T. R., *Council*, 32, Abbey Road, Enfield, Middlesex.
l.
- 1928 EARLE, Edw., F.E.S., 16, Addison Gardens, W.14.

YEAR OF
ELECTION.

- 1886 EDWARDS, S., F.L.S., F.Z.S., F.E.S., *Council*, (*Hon. Member*),
Avenue House, The Avenue, Blackheath, S.E. 3. *l, el.*
- 1923 ELLIS, H. Willoughby, F.E.S., F.Z.S., M.B.O.U., "Speldhurst
Close," Sevenoaks, Kent. *c, orn.*
- 1932 ENNIS, L. H., 16, Ernle Road, Wimbledon, S.W.20. *l.*
- 1926 ENNIS, P. F., 16, Ernle Road, Wimbledon, S.W.20.
- 1920 FARMER, J. B., 156, Loughborough Park, Brixton, S.W.9. *l.*
- 1924 FASSNIDGE, Wm., M.A., F.E.S., 47, Tennyson Road, Portswood,
Southampton. *l, n, trich, he.*
- 1930 FERRIER, W. J., 22, Dagnall Park, S. Norwood, S.E.25. *l.*
- 1887 FLETCHER, W. H. B., M.A., F.E.S., Aldwick Manor, Bognor,
Sussex. (*Life Member*.) *l.*
- 1926 FLETCHER, P. Bainbrigge, B.Sc., 65, Compton Road, Wimble-
don, S.W.19. *c.*
- 1889 FORD, A., "South View," 42, Irving Road, West Southbourne,
Bournemouth, Hants. *l, c.*
- 1920 FORD, L. T., "St. Michael's," Park Hill, Bexley, Kent. *l.*
- 1915 FOSTER, T. B., "Lenore," 1, Morland Avenue, Addiscombe,
Croydon. *l.*
- 1907 FOUNTAINE, Miss M. E., F.E.S., "The Studio," 100A, Fellows
Road, Hampstead, N.W.3. *l.*
- 1921 FRAMPTON, Rev. E. E., M.A., Halstead Rectory, Sevenoaks,
Kent. *l.*
- 1886 FREMLIN, Major H. S., M.R.C.S., L.R.C.P., F.E.S., "Heavers,"
Ryarsh, Kent. *l.*
- 1919 FRISBY, G. E., F.E.S., 29, Darnley Road, Gravesend. *hym.*
- 1912 FROHAWK, F. W., M.B.O.U., F.E.S., "Essendene," Cavendish
Road, Sutton, Surrey. *l, orn.*
- 1911 GAHAN, C. J., D.Sc., M.A., F.E.S., "The Mount," Aylsham,
Norfolk. *c.*
- 1920 GAUNTLETT, H. L., M.R.C.S., L.R.C.P., F.E.S., 37, Howard Lane,
Putney, S.W.15. *l.*
- 1927 GIBBINS, F. J. F.I.A.A., F.I.A.S., 51, Weldon Crescent, Harrow,
Middlesex. *l.*
- 1928 GILLES, W. S., F.E.S., F.I.C., "The Cottage," Bocking, Braintree,
Essex. *l.*
- 1930 GILLIATT, F. T., F.E.S., 25, Manor Road, Folkestone, Kent. *l.*
- 1929 GLEGG, D. L., F.E.S., "Vermala," 9, Westleigh Avenue, Putney,
S.W.15. *l.*

YEAR OF
ELECTION.

- 1920 GOODMAN, A. de B., F.E.S., *Council*, The Old Malt House, Shenley, Church End, nr. Bletchley, Bucks. *l.*
- 1926 GORDON, D. J., B.A., F.E.S., Craigellachie House, Strathpeffer, N.B. *col., lep.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend. *l.*
- 1925 GRAVES, P. P., F.E.S., 5, Hereford Square, S.W.7. *l.*
- 1918 GREEN, E. E., F.E.S., F.Z.S., "Ways End," Camberley, Surrey. *hem.*
- 1924 GREER, T., J.P., "Milton," Sandholes, Dungannon, Co. Tyrone. *l.*
- 1926 GREY, Olive, Mrs., F.Z.S., 90, Charing Cross Road, W.C.2. *ent.*
- 1911 GROSVENOR, T. H. L., F.E.S., *President*, Springvale, Linkfield Lane, Redhill. *l.*
- 1884 HALL, T. W., F.E.S., 61, West Smithfield, E.C. 1. *l.*
- 1926 HALTON, H. C. S., Essex Museum, West Ham, E.
- 1891 HAMM, A. H., A.L.S., F.E.S., 22, Southfields Road, Oxford. *l.*
- 1903 HARE, E. J., F.E.S., 4, New Square, Lincoln's Inn, W.C. 2. *l.*
- 1926 HARMSWORTH, SIR H. A. B., F.E.S.,
- 1926 HARRIS, A. G. J., B.A., 21, Nevern Place, S.W.5.
- 1924 HARWOOD, P., F.E.S., Westminster Bank, 92, Wimborne Road, Winton, Bournemouth. *l.*
- 1927 HAWGOOD, D. A., 89, Leigham Vale, Tulse Hill, S.W.2. *l.*
- 1924 HAWKINS, C. N., F.E.S., 23, Dalebury Road, Upper Tooting, S.W.17. *l.*
- 1929 HAWLEY, Lt.-Col. W. G. B., 13, Colville Road, W.11.
- 1913 HAYNES, E. B., 82a, Lexham Gardens, W. 8. *l.*
- 1923 HAYWARD, Capt. K. J., F.E.S., F.R.G.S., Florida 414, Buenos Aires, Argentina. *l. orn, c.*
- 1920 HEMMING, Capt. A. F., F.Z.S., F.E.S., 29, West Cromwell Road, S.W. 5. *l.*
- 1924 HENDERSON, J. L., 6, Haydn Avenue, Purley, Surrey. *col.*
- 1931 HERRMANN, E. R., 29, Lebanon Park, Twickenham. *l.*
- 1931 HESLOP, J. R. P., M.A., F.E.S., 34, Henleage Gardens, Westbury on Trim, Bristol.
- 1927 HEWER, H. R., M.Sc., D.I.C., Royal College of Science, S. Kensington, S.W. 7.
- 1920 HODGSON, S. B., "St. Philips," Charles Street, Berkhamsted, Herts.
- 1927 HOWARD, J. O. T., B.A., 78, St. John's Wood Court, N.W.8.
- 1931 HOWARTH, T. G., 77, Woodland Rise, Muswell Hill, N.10. *l.*

YEAR OF
ELECTION.

- 1927 HUGHES, A. W. McKenny, 22, Stanford Road, Kensington, W.8. *ec. ent.*
- 1929 HUGHES, A. W., "Delamere," Buckingham Way, Wallington.
- 1928 JACKSON, F. W. J., "The Pines," Ashted, Surrey.
- 1914 JACKSON, W. H., "Pengama," 14, Woodcote Valley Road, Purley. *l.*
- 1923 JACOBS, S. N. A., *Hon. Secretary*, Ditchling, Hayes Lane, Bromley. *l.*
- 1924 JAMES, A. R., 14, Golden Lane, E.C.1. *l.*
- 1924 JAMES, R., F.E.S., 14, Golden Lane, E.C.1.
- 1927 JANSON, O. J., F.E.S., *Council, Recorder*, 13, Fairfax Road, Hornsey, N.8. *ent.*
- 1925 JARVIS, C., 12, Claylands Road, Clapham, S.W.8. *c.*
- 1930 JOHNSON, E. E., Pilgrim Way, Drive Spur, Kingswood, Surrey. *l.*
- 1923 JOHNSTONE, J. F., F.E.S., "Courtlands," Clarence Parade, Southsea. *l.*
- 1928 KETTLEWELL, H. B. D., "Hovedene," 15, St. Augustine's Road, Edgbaston, Birmingham. *l.*
- 1910 KIDNER, A. R., "The Oaks," Station Road, Sidcup, Kent. *l.*
- 1925 KIMMINS, D. E., 16, Montrave Road, Penge, S.E. 20. *l.*
- 1925 LABOUCHERE, F. A., F.E.S., *Council*, 15, Draycott Avenue, S.W.3.
- 1924 LANGHAM, Sir Chas., Bart., F.E.S., Tempo Manor, Co. Fermanagh. *l.*
- 1927 LAWSON, H. B., F.E.S., "Brookhill," Horsell, Woking. *l.*
- 1922 LEECHMAN, C. B., "Pansala," Roundabouts, Storrington, Sussex. *l.*
- 1914 LEEDS, H. A., 2, Pendercroft Road, Knebworth, Herts. *l.*
- 1919 LEMAN, G. C., F.E.S., "Wynyard," 52, West Hill, Putney Heath, S.W. 15. *c.*
- 1926 LONG, R. M., Witley, 3, Cedars Road, Beddington, Surrey. *l.*
- 1925 MACCALLUM, C., 1, Aston Road, Ealing, W.5. *l.*
- 1926 MACDONALD, F. W., 82, Trinity Street, Leytonstone, E.11. *l.*
- 1931 MACNULTY, B. J., "Rutland," 67, All Saints Road, Sutton.
- 1892 MAIN, H., B.S.C., F.E.S., F.Z.S., "Almondale," 55, Buckingham Road, S. Woodford, E.18. *l, nat. phot., col.*
- 1889 MANSBRIDGE, W., F.E.S., "Monreith," Derby Road, Formby, Liverpool. *l, c., etc.*
- 1930 MARSH, D. G., "Delville," Oxenden Square, Herne Bay. *l.*

YEAR OF
ELECTION.

- 1922 MASSEE, A. M., F.E.S., East Malling Research Station,
Kent. *l*.
- 1932 MELLOWS, W. T., M.B.E., Scatton, Thorpe Road, Peterborough.
- 1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E.16.
l, h, d, e l, e h, e d, mi.
- 1930 MORLEY, A. McD., 9, Radnor Park West, Folkestone.
- 1928 DE MORNEY, C. A. G., Flat 5, 60, Hogarth Road, Earls Court,
S.W.5.
- 1920 MORISON, G. D., F.E.S., Dept. Advisory Entomology, N. of
Scotland Agricultural College, Marichall, Aberdeen. *ec. ent.*
- 1929 NASH, J. A.,
- 1923 NASH, T. A. M., F.E.S., 16, Queen's Road, Richmond, Surrey. *l*.
- 1923 NASH, W. G., F.R.C.S., "Clavering House," de Pary's Avenue,
Bedford. *l*.
- 1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l*.
- 1926 NEWMAN, L. H., Salisbury Road, Bexley, Kent. *l*.
- 1930 NIBLETT, M., 10, Greenway, Wallington, Surrey. *l*.
- 1931 NICHOLSON, D. A., 11, Birkbeck Road, Dulwich, S.E.21.
- 1926 NIXON, G. E., 315B, Norwood Road, Herne Hill, S.E.24. *h, l*.
- 1911 PAGE, H. E., F.E.S., "Bertrose," 17, Gellatly Road, New
Cross, S.E.14. *l*.
- 1927 PALMER, D. S., "North Lodge," Esher.
- 1930 PEARMAN, Capt. A., Elm Cottage, Purley, Surrey. *l*.
- 1908 PENNINGTON, F., Oxford Mansions, Oxford Circus, W.1. *l*.
- 1928 PERKINS, J. F., F.E.S., 19, Courtfield Gardens, S.W.5. *h*.
- 1925 PORTSMOUTH, J., 15, Victoria Street, Westminster, S.W.1. *l*.
- 1925 PORTSMOUTH, G. B., 15, Victoria Street, Westminster, S.W.1. *l*.
- 1912 POULTON, PROF. E. B., D.SC., M.A., F.R.S., F.L.S., F.G.S.,
F.Z.S., F.E.S., "Wykeham House," Oxford. (*Hon. Member.*)
- 1927 PRATT, W. B., 10, Lion Gate Gardens, Richmond Lane.
- 1897 PREST, E. E. B., 8 and 9, Chiswell Street, E.C.1. *l*.
- 1924 PRIEST, C. G., 30, Princes Place, Notting Hill, W.11. *l*.
- 1904 PRISKE, R. A. R., F.E.S., 136, Coldershaw Road, W. Ealing,
W.5. *l, m.*
- 1919 QUILTER, H. J., "Fir Cottage," Kiln Road, Prestwood, Great
Missenden. *l, c, d, mi.*
- 1922 RAIT-SMITH, W., F.Z.S., F.E.S., F.R.H.S., "Hurstleigh,"
Linkfield Lane, Redhill, Surrey. *l*.
- 1925 RALFS, Miss E. M., F.E.S., "Montpelier House," 60, Clarendon
Road, Holland Park, W.11.

YEAR OF
ELECTION.

- 1922 RATTRAY, Col. R. H., Halliford House, Newton Abbot, Devon.
l.
- 1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham
Common, S.W. 4. *orn.*
- 1927 RICHARDS, Percy R., "Wynford," 69, Upton Road, Bexley
Heath. *l.*
- 1920 RICHARDSON, A. W., F.E.S., 28, Avenue Road, Southall,
Middlesex. *l.*
- 1908 RILEY, Capt. N. D., F.E.S., F.Z.S., 7, McKay Road, Wimbledon,
S.W.20. *l.*
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pul-
borough, Sussex. *l.*
- 1922 ROBERTSON, W. J., M.R.C.S., L.R.C.P., F.Z.S., 69, Bedford Road,
S.W. 4. *l.*
- 1911 ROBINSON, Lady MAUD, F.E.S., Kirklington Hall, Newark.
l, n.
- 1920 ROTHSCHILD, THE RIGHT HON. LORD, D.SC., F.R.S., F.L.S., F.Z.S.,
F.E.S., Tring, Herts. *l, orn. (Life Member.)*
- 1887 ROUTLEDGE, G. B., F.E.S., "Tarn Lodge," Heads Nook, Carlisle.
l, c.
- 1890 ROWNTREE, J. H., "Scalby Nabs," Scarborough, Yorks. *l.*
- 1932 RUDLAND, W. L., 211, Caversham Road, Reading.
- 1932 RUSSELL, A. G. B., Scarbank House, Swanage, Dorset. *l.*
- 1915 RUSSELL, S. G. C., "Brockenhurst," Reading Road, Fleet,
Hants. *l.*
- 1908 ST. AUBYN, Capt. J. A., F.E.S., 14, Purley Knoll, Purley.
- 1914 SCHMASSMANN, W., F.E.S., "Beulah Lodge," London Road,
Enfield, N. *l.*
- 1910 SCORER, A. G., "Hillcrest," Chilworth, Guildford. *l.*
- 1927 SCOTT, E., M.B., "Hayesbank," Ashford, Kent. *l.*
- 1923 SEVASTOPULO, D. G., F.E.S., c/o Ralli Bros. Ltd., Calcutta. *l.*
- 1910 SHELDON, W. G., F.Z.S., F.E.S., "West Watch," Oxted,
Surrey. *l.*
- 1898 SICH, ALF., F.E.S., "Grayingham," Farncombe Road,
Worthing. *l.*
- 1925 SIMMONS, A., 42, Loughboro Road, W. Bridgford, Nottingham. *l.*
- 1927 SKELTON, Hy. E., 12, Mandrake Road, Upper Tooting,
S.W. 17.
- 1921 SMART, Major, H. D., R.A.M.C., M.D., D.SC., F.E.S., 172, High
Road, Solway Hill, Woodford Green. *l.*

YEAR OF
ELECTION.

- 1908 SPERRING, C. W., 8, Eastcombe Avenue, Charlton, S.E. 7. *l*.
- 1920 STAFFORD, A. E., "Corydonis," 83, Colborne Way, Worcester Park, Surrey.
- 1927 STANLEY-SMITH, F. S., F.E.S., *Council*, "Alpha Cottage," Datchworth, Knebworth, Herts.
- 1928 STANLEY-SMITH, Mrs. Maud, "Alpha Cottage," Datchworth, Knebworth, Herts.
- 1928 STOCKEN, H. E. W., Orchard Cottage, W. Byfleet, Surrey.
- 1924 STOREY, W. H., 7, Lansdowne Place, W.C.1. *ent*.
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 42, Chalkwell Avenue, Westcliff-on-Sea, Essex.
- 1932 STRINGER, A. H., 19, Exeter Road, Croydon.
- 1929 STUBBS, G. C., 41, St. Mary's Street, Ely, Cambs.
- 1916 SYMS, E. E., F.E.S., *Hon. Librarian*, 22, Woodlands Avenue, Wanstead, E.11. *l*.
- 1920 TALBOT, G., F.E.S., "The Hill Museum," Witley. *l*.
- 1922 TAMS, W. H. T., F.E.S., 5, Daisy Lane, Hurlingham, S.W. 6. *l*.
- 1894 TARBAT, Rev. J. E., M.A., 1, Romsey Road, Winchester. *l, ool*.
- 1913 TATCHELL, L., F.E.S., Swanage, Dorset. *l*.
- 1925 TAYLOR, J. S., F.E.S., P.O. Box 513, Pretoria, Union of S.A. *l*.
- 1929 TETLEY, J., "White Cottage," Silverlea Gardens, Horley.
- 1931 THOMPSON, J. A., Tan-y-Bryn School, St. Margarets Drive, Llandudno, N. Wales. *l*.
- 1926 TOMLINSON, Florence B., "The Anchorage," Lodge Road, Croydon. *l*.
- 1902 TONGE, A. E., F.E.S., *Hon. Treasurer*, "Aincroft," Grammar School Hill, Reigate. *l*.
- 1927 TOTENHAM, Rev. C. E., F.E.S., "Keswick," 18, Tyrone Road, Thorpe Bay, Essex. *c*.
- 1887 TURNER, H. J., F.E.S., F.R.H.S., *Hon. Editor*, "Latemar," 25, West Drive, Cheam, Surrey. *l, c, n, he, b*.
- 1921 VERNON, J. A., "Firlands," Ascot, Berks. *l*.
- 1923 VREDENBERG, G., 38, Ashworth Mansions, Maida Vale, W.9. *l*.
- 1889 WAINWRIGHT, C. J., F.E.S., 172, Hamstead Road, Handsworth, Birmingham. *l, d*.
- 1927 WAINWRIGHT, Chas., 29, Northfield Road, Kings Norton, Birmingham. *d*.

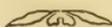
YEAR OF

ELECTION.

- 1929 WAINWRIGHT, J. Chas., 8, Kingsdown Avenue, W. Ealing, W.
 1929 WAINWRIGHT, John, 8, Kingsdown Avenue, W. Ealing, W.
 1911 WAKELY, L. D., 11, Crescent Road, Wimbledon, S.W.20. *l.*
 1930 WAKELY, S., 8, Woodland Hill, Upper Norwood, S.E.19.
 1880 WALKER, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*
 1927 WALKER, W. H., "Ranworth," Potters Bar. *l.*
 1925 WARD, J. DAVIS, F.E.S., "Limehurst," Grange-over-Sands. *l.*
 1920 WATSON, D., "Proctors," Southfleet, Kent. *l.*
 1928 WATTS, W. J., 42, Bramerton Road, Beckenham. *c.*
 1928 WELLS, Clifford, "Dial House," Crowthorne, Berks. *l.*
 1911 WELLS, H. O., York Gate, Cheam Road, Ewell. *l.*
 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.E.S., "Ellesmere," Gratwicke Road, Worthing. *l.*
 1927 WHITE, A. G., "Hilltop," Chaldon, Surrey.
 1930 WILKINS, C., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W.19.
 1914 WILLIAMS, B. S., "St. Genny's," 15, Kingcroft Road, Harpenden. *l, c, hem.*
 1912 WILLIAMS, C. B., M.A., F.E.S., Rothamsted Experimental Station, Harpendon. *l, ec. ent.*
 1925. WILLIAMS, H. B., LL.D., F.E.S., "Woodcote," 36, Manor Gate Road, Kingston Hill, Surrey. *l.*
 1927 WITTING, A. N., 6, Woolstone Road, Catford, S.E. 6.
 1918 WOOD, H., "Albert Villa," Kennington, near Ashford, Kent. *l.*
 1926 WOOTTON, W. J., F.R.H.S., Wannock Gardens, Polegate, Sussex. *l.*
 1927 DE WORMS, C. G. M., F.E.S., M.B.O.U., *Council*, Milton Pk., Egham, Surrey. *l, orn.*
 1930 WORSFOLD, L. B., 24, Rectory Avenue, High Wycombe, Bucks.
 1921 WORSLEY-WOOD, H., F.E.S., 37, De Freville Avenue, Cambridge. *l.*

Members will greatly oblige by informing the Hon. Sec. of any errors in, additions to, or alterations required in the above Addresses and descriptions.

REPORT OF THE COUNCIL FOR 1931.



At the close of the sixtieth year of the existence of the South London Entomological and Natural History Society, the Council is pleased to be able to congratulate the members on another successful twelve months' work, and to note that the main object of the Society, "The Diffusion of Biological Science," has been kept well in view throughout.

Nine new members have been elected, and there have been four resignations while none have been deleted from the membership roll for non-payment of subscriptions. The deaths of three members have been recorded; that of Major Liles in March, of Mr. E. Step, F.L.S., in November, and of W. J. Lucas, B.A., F.E.S. in January, 1932, thus the membership at present stands as follows: Hon. Members 2, Life Members 4, Country Members 37, Ordinary Members 208, giving a total membership of 251.

The balance sheet duly audited (see pp. xviii.-xix.) and the Hon. Treasurer's Statement (see p. xvii.) show that the Finances of the Society, under the able guidance of Mr. A. E. Tonge, continue in a satisfactory state.

The meetings of the Society have been well attended throughout the year, the average attendance for the twenty-two ordinary meetings was 37; the exhibits have been somewhat more numerous than has been the case in the past few years, but the Council would again impress on members the duty of furnishing notes adequate completely and fully to describe the exhibits and their purport.

The annual Special Exhibition of Varieties held now at the second meeting in October was, as usual, very well attended by members and their friends, and the large number of exhibits was much appreciated. The thanks of the Society are due to Mr. T. H. L. Grosvenor and Mr. A. de B. Goodman for their assistance in making the necessary arrangements.

Papers, Addresses, and Lectures have been given before the Society by Messrs. T. H. L. Grosvenor, A. E. Tonge, A. J. Wilmott, Hy. J. Turner, E. J. Bedford, Mrs. Grant and Miss Cheesman.

There were nine Field Meetings during the year, all more or less marred by the extremely adverse weather conditions which prevailed

the whole summer, the Meetings at Box Hill and St. Martha's being exceptionally wet even for this summer. The Field Meetings were arranged to St. Martha's, Ockham, Westerham, Groombridge, Prince's Risboro, Chalfont Road, Box Hill, Westerham, and Clandon. The thanks of the Society are due to those members who made the arrangements for these meetings.

The Lantern has been in use on seven occasions, and thanks are due to Mr. J. H. Adkin for his help as operator.

The volume of Proceedings for 1930-31 was published somewhat earlier than usual in the year and consisted of 94+xx pp. with four plates and a portrait. The thanks of the society are due to the Publication Committee, and particularly to Mr. Robert Adkin for his help in the production of this valuable record of the Society's doings.

Mr. R. Adkin and Mr. H. J. Turner were the Society's representatives at the Congress of the South Eastern Union of Scientific Societies at Winchester in June. A report of the Congress has been communicated by Mr. Adkin (see p. 84).

Mr. R. Adkin was the Society's delegate at the meeting of the British Association in London in September; a short report of the Meeting was communicated to the Society by him. (see p. 100).

The Council is much indebted to Mr. Adkin for these reports.

The Honorary Curator, Mr. S. R. Ashby, reports as follows:

"The amalgamation of the collections of British Lepidoptera has now been completed as far as the end of the Tortricina, and it is hoped that the Tineina will soon be available for reference.

"During the past year, numerous donations have been received from the following members:

"Mr. Robert Adkin: A box of Tineina including a series of the extremely local *Blastobasis lignea*.

"Mr. E. C. Bedwell: 120 species of British Coleoptera not previously represented in the Society's collection.

"Mr. K. G. Blair: The newly identified British Species of Plume Moth, *Agdistis staticis*.

"Mr. A. W. Dennis: Species of Micro Lepidoptera.

"Mr. A. A. W. Buckstone: British Lepidoptera including *Leptosia sinapis*.

"Mr. S. N. A. Jacobs: *Diacrisia lutea (lubricipeda)* ab. *radiata*, and *Biston betularia* ab. *carbonaria (doubledayaria)*.

"Dr. G. V. Bull: A smoky aberration of *Biston betularia*.

“ Mr. C. N. Hawkins : Preserved larvae and pupae of several British Bombyces.

“ Mr. F. W. Macdonald : A specimen of the brilliant Madagascar moth *Urania madagascariensis (ripheus)*.

“ Mr. H. W. Andrews, Mr. E. J. Bunnett, and Dr. E. A. Cockayne : Numerous species of British Diptera.

“ Mrs. M. Stanley Smith : Various Hymenoptera and Coleoptera.

“ Mr. C. Jarvis : A number of British Neuroptera and Trichoptera.

“ The best thanks of the Society are due to the above members who have so generously helped to make the Reference Collections as complete as possible.”

The Librarian reports as follows :—

“ During the year the usefulness of the Library has been increased by the gift of a number of rare and valuable bound volumes. The entomological journals have been bound up to date, and 200 volumes have been lent for home study.”

Owing to the continued indisposition of the Honorary Secretary, Mr. Stanley Edwards, during the latter part of the year, your Council found it necessary to ask Mr. S. N. A. Jacobs to assist in the Secretarial duties.

The Council regrets to report that subsequently Mr. Edwards expressed the desire to retire from the office of Honorary Secretary at the end of the year, and it has nominated Mr. S. N. A. Jacobs to fill the vacant post.

The Council wishes to express its sincere appreciation of Mr. Stanley Edwards' long, earnest and successful connection with the Society, he having been continuously in office from January, 1894, a period of thirty-eight years.

In view of the long and valuable services rendered to the Society by Mr. Stanley Edwards and Mr. Robert Adkin, the Council has unanimously nominated both these gentlemen as honorary Members of the Society under Bye-law 8.

The following is a list of the Additions to the Library.

BOOKS.—Spiders of Porto Rico : Moths of Eastbourne, Pt. II. (Mr. R. Adkin) : Monograph of the Crinoids ; Diptera of Patagonia, 2 vols. (Brit. Mus.) : Braithwaite's British Mosses, 3 vols. (Mr. E. Step and Mr. Hy. J. Turner) : Joy's Practical Handbook of Brit. Beetles (Mr. K. G. Blair).

PERIODICALS AND MAGAZINES.—Entomologist (The Editor) : Entomologist's Record (The Editor) : Entomologist's Monthly

Magazine (by purchase): Entomological News: Natural History (Amer. Mus.): Philippine Journal of Science: Canadian Entomologist: Essex Naturalist: Vasculum: Revue Russe d'Entomologie: Naturalist: London Naturalist: Zoolog. Bidrage: Revista Ent. Soc. Argentina.

PROCEEDINGS, TRANSACTIONS, REPORTS OF SOCIETIES, ETC.—S.E. Naturalist and Antiquary: Bull. Soc. Entomologique de France: Ann. Report of the Smithsonian Institute: Ann. Report of the Conference of Delegates to the British Association (Mr. R. Adkin): Trans. Entomological Soc. of London (Dr. Fremlin): Bolletino R. Scuola d'Agricoltura, Portici, 1928, 1929: Rep. Commons and Footpaths Preservation Society: Report of the U.S.A. National Mus.: Annales Soc. Ent. Fr.: Rep. Bournemouth Nat. Science Soc.: Rep. Imper. Entomologist at Pusa: Trans. and Proc. Perthshire Nat. Science Soc.: Rep. Chicago Field Mus.: Trans. Wisconsin Acad. of Science.

SEPARATES AND PAMPHLETS.—Folia Zoologica II.: List of Literature of Authorities on Brit. Diptera (Mr. H. W. Andrews): Genus *Peronea* (Mr. W. G. Sheldon): Southern Rambles: Some gall-causing *Tripetidae* (Mr. Niblett): Catalogue of Indian Insects, Alucitides: Seps. from the Smithsonian Institute 37: Seps. from Chicago Field Mus. 5: Seps. Lloyd Library 2: Seps. from Buenos Aires Nat. Mus. of N.H. 61: Seps. from Argentine 2 (Capt. Hayward).

For which the Society tender their thanks to the various donors.

TREASURER'S REPORT, 1931.

In spite of the world-wide financial troubles I am glad to be able to say that the position of your Society is again satisfactory, and that our regular income has slightly increased. Subscriptions have come in better, and although there are still a number of 1931 subscriptions unpaid, actual receipts for current subscriptions are up by £8 10s. and arrears collected have reached a total of £16 15s. against the £10 estimated as being their value in my last Balance Sheet. This result is largely due to the three reminders I sent out during the year instead of two as in 1930.

I would again remind members that it saves both them and me time, trouble and expense if they will arrange for their subscriptions to be paid annually by their bankers on January 1st, and that I have forms printed for this purpose which I shall be happy to supply on application. Deposit interest has produced an additional 25/6 having been transferred to Home Safe-deposit account, which carries a higher rate of interest at the bank.

The cost of many of the half tone blocks used in the Transactions was again borne by a member, who is very well known for his liberality in this and other directions, and who contributed £14 16s. 10d. for this purpose. This very nearly covers the increased cost of printing as against 1930, which is shown in the accounts. Sales of Transactions were up on last year by £3 8s. 6d. A windfall of £36 in the shape of $\frac{4}{5}$ of the £50 legacy to the Society left by our late member Major C. E. Liles, less government tax of £4, has been received, and this will no doubt be invested in due course. We have had no arrears of income tax to provide for, no transit costs for specimens given to the Society, and no additional books were purchased for the library, all heavy items in last year's accounts, so that our outgoings are less than in 1930, but printing and stationery have been more costly by £9 2s. 6d. and contributions to the Refreshments Fund have fallen off by £3 4s. 1d. The last item is however set off by a reduction in the cost of Catering of £3.

Printing our Transactions has cost us £16 0s. 9d. more than last year, owing to the numerous plates referred to above. Entrance

[continued on p. xx.

PUBLICATION FUND.

| | £ s. d. | | £ s. d. |
|-------------------------------|----------|------------------------------------|---------|
| To Printing Proceedings | 60 8 0 | By Balance brought from 1930 | 4 0 7 |
| „ Reprints | 2 5 4 | „ Donations | 18 6 4 |
| „ Half-tone Blocks | 14 16 10 | „ Chapman Memorial div. | 15 0 0 |
| „ | 77 10 2 | „ Sales | 5 5 8 |
| „ | 1 17 2 | „ Vote from General Fund | 40 0 0 |
| „ | 3 5 3 | | |
| „ Balance carried down | £82 12 7 | | |

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

| | £ s. d. | | £ s. d. |
|-------------------------------|----------|---|----------|
| To Balance carried down | 64 11 6 | By balance brought forward from 1930 | 27 11 6 |
| „ | £64 11 6 | „ Entrance fees | 1 0 0 |
| | | „ Legacy from the late Major C. E. Liles less tax | 36 0 0 |
| | | | £64 11 6 |

BALANCE SHEET.

| <i>Liabilities.</i> | £ s. d. | <i>Assets.</i> | £ s. d. |
|--|----------|--|----------|
| To Balance, being excess of assets over liabilities .. | 827 1 3 | By Balances— | |
| | | General Fund | 111 6 0 |
| | | Publication Fund | 3 5 3 |
| | | Library Fund | 6 0 0 |
| | | Suspense a/c | 64 11 6 |
| | | „ Investments at current quotations | 179 8 9 |
| | | 5% War Stock (£300) at 96 $\frac{1}{8}$ | 289 17 6 |
| | | 3 $\frac{1}{2}$ % Conversion Loan (£290) at 75 | 217 15 0 |
| | | 4% Consols (£154 14s.) at 84 | 130 0 0 |
| | | „ Subscriptions unpaid:— | 637 12 6 |
| | | Good | 7 10 0 |
| | | Doubtful, or bad | 12 10 0 |
| | | say | 10 0 0 |
| | £827 1 3 | | £827 1 3 |

Examined and found correct, this 25th January, 1932.

T. W. HALL,
H. W. ANDREWS, } *Auditors.*

fees show a drop of 50%, and we have no sales of cabinets or apparatus to record.

Investments can no longer be taken in our balance sheet at cost owing to the heavy fall in market values which has taken place during the year, so these are now set down at current market prices, and on this basis they show a loss of £29 7s. 7d. on last years' figures. I am sure we all hope that it will not be long before an improvement takes place in this respect, and that by this time next year the loss and possibly more will have been recovered.

The net result is that we are able to show an increase of assets over liabilities of £29 1s. 0d. for the year, which I hope will be regarded by you, as by myself, as satisfactory in the face of adverse conditions over which we have no control.

The Accounts and Balance Sheet have been duly audited and certified as correct by Messrs. T. W. Hall and H. W. Andrews, who again undertook these arduous duties and to whom our thanks are due for so doing.

I should also wish to thank very heartily those members who have supported the Publications and Refreshments Funds and thereby enabled me to show an improvement in the financial status of our Society.—A. E. TONGE. *Hon. Treasurer.*

The Ova of British Lepidoptera. Pt. II. Noctuidae.
(With Plates II.-V.)

By. A. E. TONGE, F.E.S.—Read March 12th, 1931.

In my former paper on the ova of our British Moths I followed the system of classification used in South's "Moths of the British Isles" to the end of the *Lithosiinae*.

I now propose to continue the same procedure right through that very large family the *Noctuidae*, comprising 333 species, which South, following the lead of Staudinger, divides into five subfamilies as follows:—

| | | |
|---------------|---------------|-----------|
| Acronyctinae | 18 species in | 6 genera. |
| Trifinae | 273 " " | 104 " |
| Gonopterinae | 1 " " | 1 " |
| Quadrifinae | 23 " " | 7 " |
| and Hypeninae | 16 " " | 10 " |

placing the *Brephidae* in a small group by themselves at the end.

I have not as yet been able to photograph by any means all of these species but I have done the greater part of them, sufficient I think to get a good general idea of the types of ova they exhibit, and as these are very similar in by far the larger number of species I hope that they will not prove tiresome.

The typical Noctuid ovum is roughly hemispherical with a flat base and rather conical shape. It is an upright egg and usually the shell, which is thin and unpigmented, is ornamented with a number of ribs varying from 12 to 50 or 60, which run upwards from the outer periphery towards the micropylar area, where they converge and unite as the available space diminishes. The number of ribs is not definite in each species but varies within narrow limits. Between these ribs are usually rows of cross ridges like the rungs on a ladder. Variation in form may either be in the direction of increased height till the ovum is nearly spherical or the reverse, the latter being specially noticeable in the eggs of the Acronyctinae and of such species as lay in situations where they are subject to considerable pressure and are flattened accordingly.

There are also a very few species which do not lay round eggs but oval. These seem to be all either *Dianthoecia* or *Brephidae*. So far as I am able to say, and in the case of the latter I am as yet unable to state definitely whether the ovum is upright or flat, *Dianthoecia* ova are all upright.

Variation in sculpture tends either to multiply the number of ribs and consequently reduce the boldness of the relief or to do away with the ribs altogether resulting in a smooth shell or one merely lightly pitted all over. In some of the species which lay where the ova are subjected to pressure the ribs appear to be pressed flat and only show at the outer edge of the shell.

I have come across nothing in the nature of a freak egg in the whole of the Noctuae so far handled. *Plastenis subtusa* and *P. retusa* have the ribs so high as to appear to have been added after the egg was completed and *Prothymnia viridaria* has short spines sticking out from the angles of the sculpture. These are probably the most noticeably different from the general pattern.

The size of the egg in relation to the parent moth shows much variation, probably the smallest being *Triphaena pronuba* .50mm. and the largest *Brachionycha sphinx* 1.25mm.

ACRONYCTINAE.

This group covers two quite different types of egg. *Diphthera*, *Demas*, and *Bryophila* being what may be called typically Noctuid, while *Acrionicta*, *Craniophora* and *Arsilonche* are very much flatter and in confinement at any rate are laid in batches with much imbrication or overlapping like the tiles on a roof. They are also notable for their bright colours and markings which are visible through the transparent shell and carry a large number of ribs which are not very boldly sculptured.

I cannot see any definite distinction between the eggs of *A. psi* and *tridens* which would help identification; both are white and both have about 44 ribs. Probably *tridens* is slightly larger.

The ova are all upright with transparent shells.

Diphthera orion, width .65mm., shape hemispherical, sculpture well developed, colour black spot and red blotch.

Demas coryli, .90mm., hemispherical, rather shallow, yellowish white with red markings.

Acrionicta leporina, .40mm., flattened hemispheroid, rather shallow, white with red markings.

A. aceris, 1.25mm., flattened hemispheroid, rather shallow, yellowish white, purple markings.

A. megacephala, .96mm., flattened hemispheroid, rather shallow, pale green with chocolate markings.

A. alni, no example.

A. strigosa, no example.

A. tridens, .95mm., flattened hemispheroid, rather shallow, white.

A. psi, .90mm., flattened hemispheroid, rather shallow, white.

A. menyanthidis, .95mm., flattened hemispheroid, rather shallow, pale reddish with dark rosy markings.

A. auricoma, no example.

A. euphorbiae var. *myricae*, 1·00mm., flattened hemispheroid, palest yellow, markings blood red.

A. rumicis, 1·05mm., flattened hemispheroid, rather shallow, pale yellow, markings red.

Craniophora ligustri, 1·10mm., flattened hemispheroid, rather shallow, white, markings red.

Arsilonche albovenosa, 1·00mm., flattened hemispheroid, rather shallow, purple brown.

Bryophila perla, ·70mm., hemispherical, rather shallow, white, markings red.

B. glandifera, ·65mm., hemispherical, rather shallow, white, markings red.

B. algae, no example.

TRIFINAE.

Agrotis. A large group with many subdivisions. The eggs are usually rather more a flattened spheroid in shape, higher than hemispherical. The ribs are not deeply sculptured and colouring if any is usually limited to a central spot and outer ring of dull red; all upright.

Noctua. Flattened spheroid, upright, sculpture rather bolder, colour white or pale yellow when laid developing a central spot and outer ring of red or brown and finally becoming dark slate-grey when about to hatch.

Triphaena. Hemispherical, fairly bold sculpture, multi-ribbed, upright and with little colour pattern, yellow green or white when laid. *Pronuba* laid in large batches and noticeably smaller than *janthina* or *orbana*.

The ova are all upright and the shells thin in all species met with.

Agrotis (Euxoa) segetum, width ·75mm., shape flattened spheroid, sculpture weak, colour white, markings pale red.

A. (E.) vestigialis, no example.

A. (E.) corticea, no example.

A. (E.) cinerea, ·75mm., flattened spheroid, moderate.

A. (E.) puta, ·55mm., hemispherical, moderate, pale orange, markings red.

A. (E.) lunigera, no example.

A. (E.) cursoria, ·80mm., hemispherical, very weak, pale brownish.

A. (E.) nigricans, ·70mm., flattened spheroid, very weak, yellowish white.

A. (E.) tritici and (v. *aquilina*), ·65mm., flattened spheroid, very weak, yellow.

A. (E.) obelisca, no example.

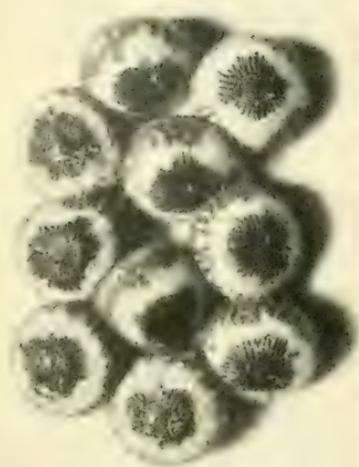
A. (Feltia) exclamatoris, ·70mm., spheroid, weak, white, markings purple.

A. ypsilon (suffusa), no example.

- A. (Lycophotia) ripae*, ·70mm., spheroid, faint, honey-coloured.
A. (L.) strigula, ·70mm., flattened spheroid, weak.
A. (Hapalia) praecox, no example.
A. (Peridroma) saucia, ·55mm., flattened spheroid, moderate, white, purple markings.
A. (Spoelotis) lucernea, no example.
A. (Pachnobia) simulans, no example.
A. (Eueretagrotis) agathina, no example.
A. (Ogygia) obscura, no example.
A. (Epipsilia) hyperborea, no example.
A. (E.) ashworthii, ·80mm. flattened spheroid, bold, white, markings purple.
Noctua (Coenophila) subrosea, ·80mm. flattened spheroid, bold, dark purple.
N. (E. carnis) augur, ·75mm., flattened spheroid, bold, green.
N. glareosa, ·65mm., flattened spheroid, bold, yellowish white, red markings.
N. castanea, ·70mm., flattened spheroid, bold, yellowish white, red markings.
N. baja, ·75mm., flattened spheroid, strong, straw colour.
N. depuncta, no example.
N. c-nigrum, ·70mm., flattened spheroid, strong, pearly white.
N. flammatra, no example.
N. ditrapezium, ·70mm., flattened spheroid, strong, greyish white.
N. triangulum, ·75mm., flattened spheroid, strong, pale yellow.
N. stigmatica, no example.
N. brunnea, ·70mm., flattened spheroid, strong, pale yellow, markings purple red.
N. primulae, ·70mm., flattened spheroid, strong, pale brownish, markings purple red.
N. dahlii, ·70mm., flattened spheroid, strong, white.
N. rubi, ·65mm., flattened spheroid, strong, pale reddish yellow.
N. umbrosa, ·70mm., flattened spheroid, strong, purplish red.
N. sobrina, no example.
N. (Segetia) xanthographa, ·70mm., flattened spheroid, strong, yellowish white and red markings.
N. (Ociropleura) plecta, ·55mm., spheroid, moderate, yellow and red.
Axylia putris, ·65mm., spheroid, strong, white, markings claret.
Triphaena (Agrotis) comes = orbona, ·70mm., hemispherical, strong, yellowish white, markings red.
T. (A.) orbona = subsequa, no example.
T. (A.) pronuba, ·50mm., hemispherical, strong, pale grey.
T. fimbria, ·70mm., hemispherical, bold, pearly gray.
T. janthina, ·75mm., hemispherical, moderate, whitish green.
T. interjecta, no example.
Eurois prasina, ·70mm., hemispherical, moderate, pearly white black markings.



13



14



15



Photo: A. E. Tonge.

EXPLANATION OF PLATE II.

13. *Acrionicta rumicis*.
14. *Bryophila perla*.
15. *Agrotis ashworthii*.
16. *Tryphaena pronuba*.

EXPLANATION OF PLATE III.

17. *Dianthoecia cucubali*.
18. *Epineuronia popularis*.
19. *Charaeas graminis*.
20. *Brachionycha sphinx*.





E. occulta, no example.

Aplecta (*Mamestra*) *tincta*, ·85mm., hemispherical, fairly bold, purple brown.

A. (M.) advena, ·90mm., hemispherical, fairly bold, pale purplish.

A. (M.) nebulosa, ·80mm., flattened spheroid, moderate, green.

Mamestra. Varying in shape from hemispherical to flattened spheroid, multi-ribbed. Sculpture also varying from bold to weak. Coloration not notably different from the last group.

Dianthoecia. A very distinct group with two types, flattened spheroid and ovoid. Both upright, either multi-ribbed faintly or pitted all over with minute depressions. Colour white, yellow, or brown, usually no colour markings.

Then follow a large number of genera with only 1 or 2 representatives each and naturally embracing a considerable difference in shape and sculpture. Nothing notable in the way of colour markings, usually multi-ribbed. All upright.

All the ova are upright and the shells thin except *C. graminis* and *D. caeruleocephala*.

Barathra brassicae, width ·60mm., shape hemispherical, sculpture strong, colour yellowish, white purple markings.

Mamestra persicariae, ·65mm., hemispherical, strong, yellowish white, purple markings.

M. albicolon, ·75mm., hemispherical, moderate, pale yellow, reddish markings.

M. oleracea, ·70mm., hemispherical, moderate, light green 1 dark spot.

M. genistae, ·70mm., flattened spheroid, moderate, white, markings purple red.

M. dissimilis, no example.

M. thalassina, ·70mm., flattened spheroid, shallow, pale brown.

M. contigua, no example.

M. pisi, ·70mm., flattened spheroid, bold, pale reddish brown.

M. trifolii, no example.

M. glauca, ·75mm., flattened spheroid, weak, white marked red brown.

M. dentina, ·65mm., flattened spheroid, rather shallow, white marked red brown.

M. peregrina, no example.

Dianthoecia luteago v. *barrettii*, no example.

D. caesia, no example.

D. conspersa, 1·00mm., ovoid, pitted all over, purple brown.

D. albimacula, no example.

D. compta, no example.

D. capsincola, ·90mm., ovoid, pitted all over, white.

D. cucubali, ·65mm., flattened spheroid, pitted all over, yellow to red.

- D. carpophaga*, ·55mm., flattened spheroid, moderately ribbed, rosy brown.
- D. (Epie)* *irregularis*, no example.
- Hecatera chrysozona*, no example.
- H. serena*, ·70mm., hemispherical, moderate, yellowish brown, darker markings.
- Neuria reticulata*, ·70mm., hemispherical, strong.
- Epineuronia popularis*, ·90mm., spheroid, bold, dark pearl.
- Tholera cespitis*, ·60mm., spheroid, moderate, yellow and red.
- Characas graminis*, ·85mm., spheroid, none, yellow to rosy.
- Pachetra leucophaea*, ·80mm., flattened spheroid, bold, pearly grey.
- Xylomyges conspiciellaris*, ·65mm., flattened spheroid, moderate, pale grey.
- Eumichtis (Hadena) satura*, no example.
- E. (H.) adusta*, ·70mm., hemispherical, moderate, white and dark red.
- E. (H.) protea*, ·70mm., hemispherical, bold, dark reddish, ribs lighter.
- Crymodes exulis*, no example.
- Bombycia viminalis*, ·65mm., very flattened, weak, pale purple red.
- Eremobia ochroleuca*, ·55mm., flattened spheroid, moderate, pale orange.
- Trachea atriplicis*, no example.
- Hyppa rectilinea*, ·75mm., hemispherical, moderate, pinkish white, markings rosy.
- Diloba caeruleocephala*, ·95mm., hemispherical, not bold, pale green, many scales adhering.
- Valeria oleagina*, ·80mm., flattened spheroid, moderate, yellow, markings red.
- Heliophobus hispidus*, ·70mm., spheroid, moderate, white, markings claret.
- Luperina testacea*, ·60mm., flattened spheroid., slight, waxy white.
- L. dumerilii*, no example.
- Cerigo matura*, ·80mm., spheroid, bold, pale pink.
- Celaena haworthii*, ·70mm., flattened spheroid, very faint, pale rosy.
- Hama abjecta*, no example.
- H. sordida*, no example.
- H. furva*, no example.
- Apamea gemina*, ·70mm., flattened spheroid, bold, white and claret.
- A. basilinea*, no example.
- A. unanimitis*, no example.
- A. pabulatricula*, no example.
- A. secalis*, ·55mm., spheroid, faint, yellow.
- A. ophiogramma*, ·55mm., flattened spheroid, weak, pale yellow.

Miana seem to be spheroid with very little sculpture and yellowish colour.

Xylophasia flattened, spheroid, nearly smooth, yellowish white.

Polia boldly ribbed and coloured with purple red spot and ring except *flavincta* which is unicolorous.

Brachionycha. The 2 species *sphinx* and *nubeculosa* bear no resemblance to each other. *Sphinx* flattened, spheroid, with bold ribs and greenish black in colour; while *nubeculosa* is smaller in size, carries many faintly sculptured ribs and is white with purple brown markings. It is also curious that the smaller insect, *sphinx*, lays an egg 25% larger than its bigger cousin.

Miana strigilis, width .60mm., shape spheroid, sculpture very faint, colour yellowish.

M. fasciuncula, no example.

M. literosa, no example.

M. bicoloria, .50mm., spheroid, very faint, yellowish white.

Phothedes captiuncula, no example.

Xylophasia rurea, no example.

X. lithoxylea, .55mm., flattened spheroid, faint, yellowish white.

X. sublustris, no example.

X. monoglypha, .60mm., flattened spheroid, faint, straw colour.

X. hepatica, no example.

X. scolopacina, no example.

Dipterygia scabriuscula, .60mm., flattened spheroid, bold, yellow to red.

Cloantha polyodon, no example.

Aporophyla lutulenta, .65mm., flattened spheroid, bold, white with purple red markings.

A. nigra, .70mm., hemispherical, bold, pale yellow.

A. australis, .65mm., hemispherical, strong, lemon.

Epunda lichenea, .70mm., flattened spheroid, weak.

Dasypolia templi, .90mm., hemispherical, moderate, white with purple red markings.

Polia flavincta, .85mm., hemispherical, bold, dark brown.

P. chi, .80mm., hemispherical, strong, whitish with purple red markings.

P. xanthomista, .85mm., hemispherical, bold, reddish brown.

Brachionycha (Astroscoptes) sphinx, 1.25mm., flattened spheroid, bold, metallic greenish black.

B. (A.) nubeculosa, 1.00mm., flattened spheroid, many shallow ribs, white, marked purple brown.

Miselia oxyacanthae, .80mm., conical spheroid, bold, grey white, markings brown.

M. bimaculosa, no example.

Agriopsis aprilina, .85mm., hemispherical, weak, white with red markings.

Trigonophora flammea, no example.

Euplexia lucipara, width .65mm., shape hemispherical, sculpture moderate, colour pale yellow markings red.

Phlogophora meticulosa, .80mm., hemispherical, fairly bold, pale yellow markings red.

Mormo maura, .80mm., flattened spheroid, weak, white, markings red.

Naenia typica, .65mm., flattened spheroid, weak, yellowish white.

Helotropha leucostigma, .65mm., spheroid, weak, dark honey.

Hydroecia (Gortyna) nictitans, .60mm., flattened spheroid, bold, pale honey.

H. micacea, .65mm., flattened spheroid, fairly strong, golden brown.

Hydroecia petasitis, no example.

Ochria ochracea, .70mm., spheroid, moderate, pale amber.

We next come to the Wainscots, which lay somewhat different eggs from the usual Noctuid type. They usually have but little sculpture and are sometimes smooth and shiny. Apparently nearly spherical when laid they become pressed into a more or less misshapen mass by reason of the pressure exerted on them by growing grass or reed stems in which they are laid; the coloration is very modest being generally pale straw, merely turning dark before hatching. A few species seem to enclose the eggs in a very thin envelope of some transparent material.

The ova are all upright, the shells are thin, in *L. obsoleta* very thin, in *L. (Sideridis) vitellina*, transparent and shiny.

Nonagria cannae, .70mm., flattened spheroid, faint, whitish.

N. sparganii, no example.

N. typhae, no example.

N. geminipuncta, 1.00mm., very flat, faint, white tinged brownish.

N. dissoluta, .90mm., very flat, faint, dirty white. Enclosed in transparent envelope.

N. neurica, no example.

Coenobia rufa, no example.

Senta maritima, .70mm., flattened spheroid, moderate, markings red brown.

Meliana flammea, .60mm., spheroid, hardly any, yellowish white.

Tapinostola fulva, .80mm., flattened spheroid, slight, white embedded in parental secretion.

T. extrema, .70mm., flattened spheroid, none or little.

T. bondii, no example.

T. hellmanni, no example.

T. elymi, .85mm., flattened spheroid, none or little, yellowish white.

Synia musculosa, no example.

Calamia lutosa, .60mm., flattened spheroid, moderate, whitish.

- C. phragmitidis*, no example.
Leucania pallens, .65mm., spheroid, none, white.
L. favicolor, no example.
L. impura, .70mm., spheroid, none.
L. straminea, no example.
L. impudens, no example.
L. obsoleta, .90mm., flattened spheroid, none, whitish.
L. litoralis, .72mm., flattened spheroid, none, pale yellow.
L. brevilinea, 1.10mm., very flat, rather faint, pale brown.
L. (Cirphis) comma, .70mm., flattened spheroid, none, pale yellow.
L. (C.) putrescens, .70mm., spheroid, rather faint, lemon yellow.
L. (C.) unipuncta, .50mm., hemispherical, none.
L. (C.) loreyi, no example.
L. (Sideridis) vitellina, .65mm., hemispherical, none, pale yellowish brown.
L. (S.) albipuncta, no example.
L. (S.) lithargyria, .70mm., hemispherical, none, pale straw.
L. (Chabuata) conigera, no example.
L. (Eriopyga) turca, .80mm., nearly globular, none to speak of.
Grammesia trigrammica, .70mm., hemispherical, strong, white markings terra cotta.

Continuing with *Caradrina*, *Amphipyra*, *Taeniocampa* and other small genera we find little of note except that one or two, such as *Stilbia anomala* and *Caradrina quadripunctata* present a rather more conical shape than usual, with sculpture varying from hardly any at all to bold ribs and colour mostly dirty white with purple or red markings. *C. exigua* has the rare habit of covering its eggs with parental hairs which have to be removed before the eggs can be examined, while the two species of *Amphipyra pyramidea* and *tragopogonis* have very different ova, the former boldly ribbed and red brown in colour, the latter faintly ribbed, brown and much misshapen. *Panolis piniperda* is orange to red and shows no colour pattern. *Taeniocampa* present a number of different styles, *populeti* being flatter and much more boldly sculptured while the others are mostly flattened spheroid in shape and the ribbing shallow. Some show colour markings and others are unicolorous.

Calymnia; *pyralina* and *trapezina* apparently cover their eggs with parental scales.

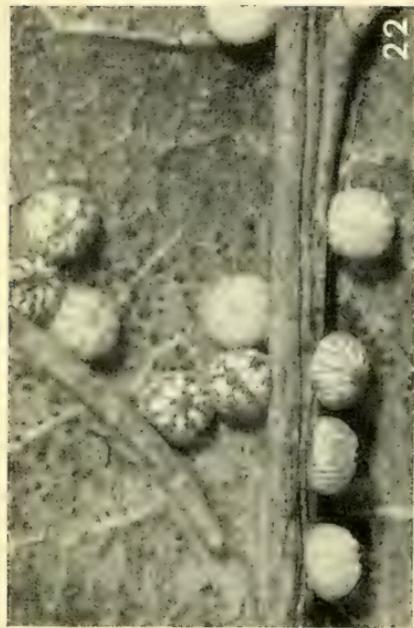
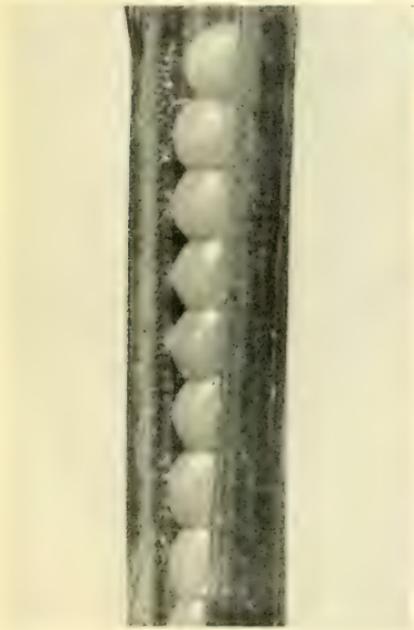
Platenis; *subtusa* and *retusa* have particularly bold sculpture standing out from the eggshell proper, while *Dyschorista fissipuncta* seems to have embedded its eggs in some sort of brown substance.

Stilbia anomala, .85mm., conical, faint, white markings purple.

Caradrina morpheus, .65mm., flattened spheroid, moderate, greenish white.

C. alsines, .60mm., flattened spheroid, moderate, pale pink, markings red.

- C. taraxaci*, no example.
C. ambigua, .55mm., hemispherical, strong, purple.
C. quadripunctata, .65mm., conical, moderate, white, markings red.
C. exigua, .45mm., spheroid, moderate, pale brown covered with parental hairs.
Petilampa arcuosa, no example.
Acosmetia caliginosa, no example.
Hydrilla palustris, no example.
Rusina tenebrosa, width .70mm., shape flattened spheroid, sculpture moderate, colour markings purple.
Amphipyra pyramidea, .75mm., flattened spheroid, bold, pale red brown.
A. tragopogonis, .55mm., flattened spheroid, weak, brown.
Panolis griseo-variegata = (*piniperda*), .80mm., flattened spheroid, moderate, orange red.
Pachnobia leucographa, .75mm., flattened spheroid, moderate, whitish, markings dark red.
P. rubricosa, .75mm., flattened spheroid, moderate, white, red markings.
Taeniocampa gothica, .70mm., flattened spheroid, weak, palest green.
T. miniosa, .75mm., flattened spheroid, moderate, pale lemon.
T. pulverulenta, .65mm., flattened spheroid, white, markings pale purple.
T. stabilis, .75mm., flattened spheroid, moderate, pale green.
T. populeti, .80mm., hemispherical, bold, brown and shiny.
T. incerta, .70mm., flattened spheroid, moderate, white, markings brown.
T. munda, .75mm., flattened spheroid, weak, white, pale orange markings.
T. opima, .60mm., flattened spheroid, weak, dark slaty grey.
T. gracilis, .65mm., flattened spheroid, very weak, yellowish white.
Dicycla oo, .75mm., flattened spheroid, very weak, palest yellow.
Calymnia pyralina, .65mm., flattened spheroid, very weak, covered with scales.
C. affinis, .55mm., flattened spheroid, very weak, pale lemon.
C. diffinis, .60mm., flattened spheroid, weak, ?
C. trapezina, .60mm., flattened spheroid, none, covered with scales.
Cosmia paleacea, .65mm., flattened spheroid, hardly any, honey yellow.
Dyschorista suspecta, .65mm., flattened spheroid, hardly any, pale brown.
D. fissipuncta (*ypsilon*), .65mm., squeezed very flat, none, embedded in brown substance.

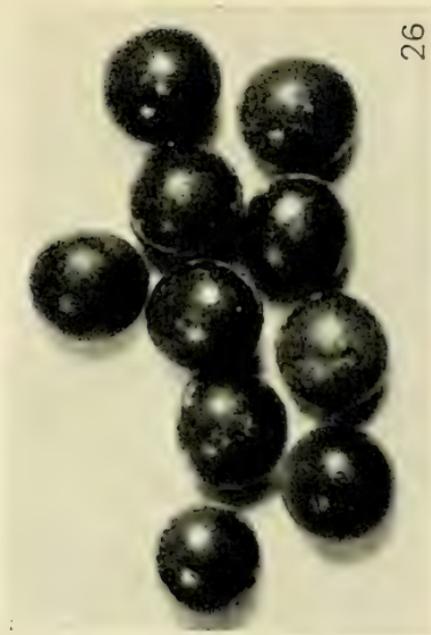
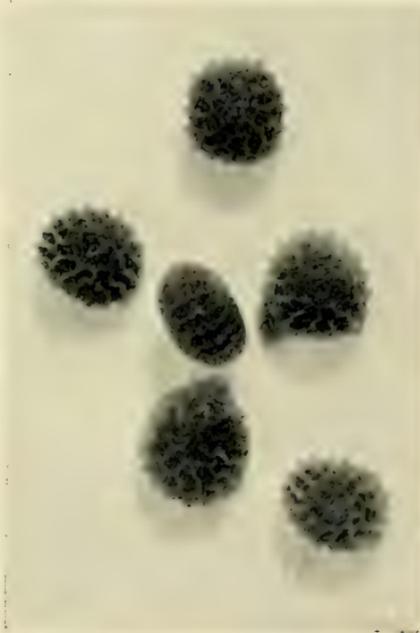


EXPLANATION OF PLATE IV.

21. *Tapinostola elymi*.
22. *Xantholeuca croceago*.
23. *Plastenis subtusa*.
24. *Xylocampa areola*.

EXPLANATION OF PLATE V.

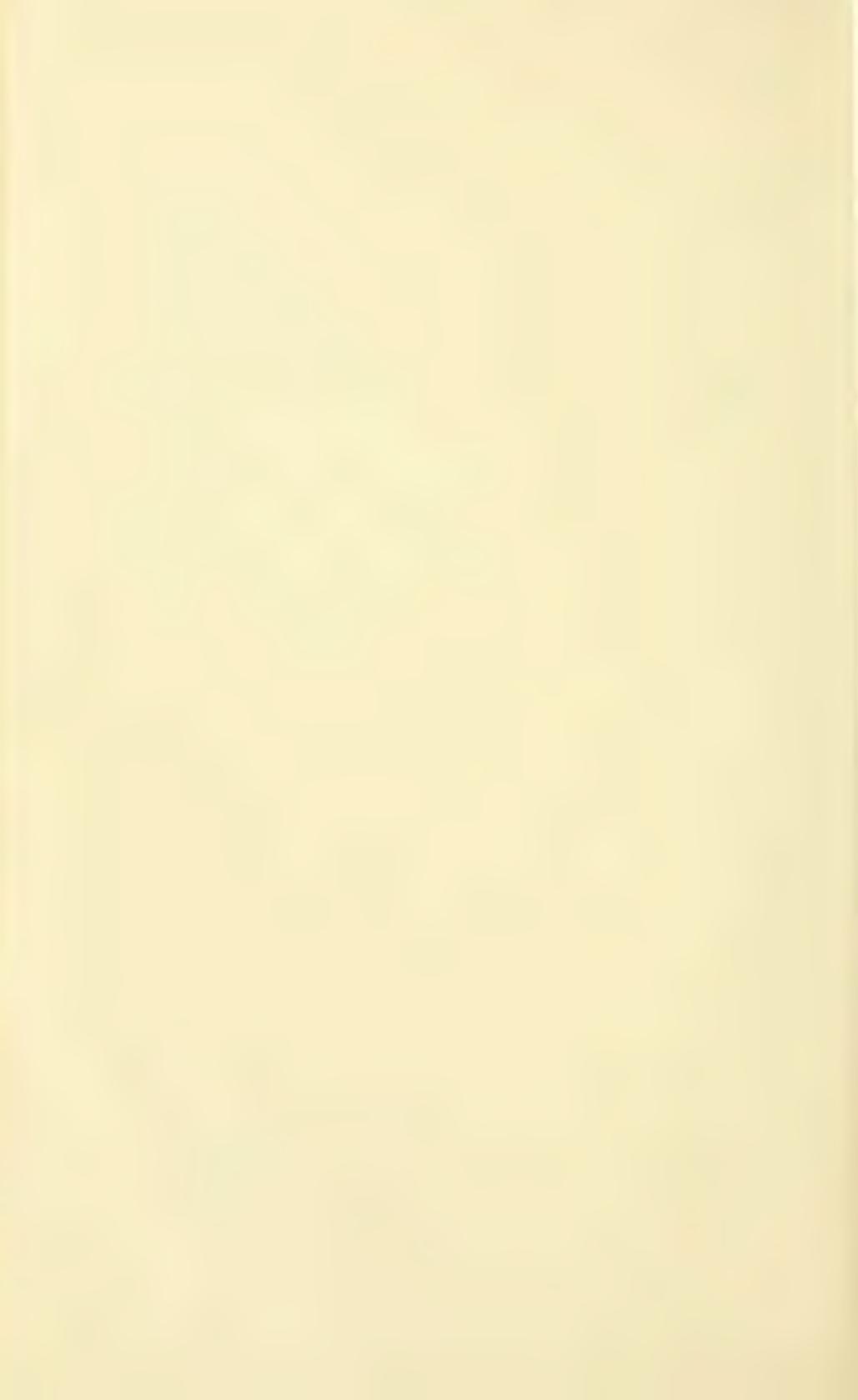
25. *Catocala promissa*.
26. *Catocala sponsa*.
27. *Zanclognatha tarsipennalis*.
28. *Brephos notha*.



26



28



Plastenis retusa, .55mm., flattened spheroid, bold, purple, ribs white.

P. subtusa, .80mm., hemispherical, very bold, white.

The Sallows are apparently an interesting family. The eggs are usually boldly ribbed and in some species the number of ribs is very small comparatively. *X. lutea* and *M. ocellaris* appear to be especially flat and *C. xerampelina* covers its eggs with parental scales. Colour usually yellow, red or brown with no colour markings, *croceago* being an exception with rosy red markings on a yellowish white ground.

Orrhodia has two species *vaccinii* and *ligula* with weak sculpture and misshapen form and one, *rubiginea*, with a well formed egg, moderately strongly ribbed.

Lithophane semibrunnea and *socia* are very much alike. The latter appears slightly smaller and has rather more red brown markings extending from the micropylar area to the outer edge.

The ova are all upright with thin shells.

Cirroedia (*Atethmia*) *xerampelina*, width .75mm., shape hemispherical, sculpture bold, colour yellowish white covered with scales.

Omphaloscelis (*Anhocelis*) *lunosa*, .65mm., flattened spheroid, moderate.

Amathes (*Orthosia*) *lota*, .60mm., hemispherical, bold, purple.

A. (O.) macilenta, .65mm., hemispherical, bold, dark purple.

A. (O.) circellaris, .65mm., hemispherical, strong, red brown.

A. (O.) helvola (*rufina*), .90mm., hemispherical, very bold, orange.

A. (O.) lychnidis (*pistacina*), .60mm., flattened spheroid, moderate, pale brown.

A. (O.) litura, .60mm., flattened spheroid, weak, dull rosy.

Cirrhia (*Xanthia*) *citrago*, .70mm., hemispherical, bold very few ribs, dark and opalescent.

Ochria (*Xanthia*) *aurago*, .80mm., hemispherical, very bold, purple brown.

Xanthia lutea (*flavago*), .45mm., very flat, micropylar area smooth very bold, few ribs, golden brown.

X. fulvago, .65mm., hemispherical, moderate, many ribs, purple red.

Mellinia (*Xanthia*) *gilvago*, .65mm., hemispherical, bold, golden brown.

M. (X.) ocellaris, .80mm., very flattened, weak, red.

Xantholeuca (*Hoporina*) *croceago*, .80mm., hemispherical, moderate, yellowish white, markings rosy red.

Orrhodia (*Conistra*) *erythrocephala*, no example.

O. (C.) vaccinii, .70mm., flattened spheroid, weak, white, markings red.

O. (C.) ligula, .70mm., flattened spheroid, weak, white tinged with yellow.

O. (Dasycampa) rubiginea, .90mm., flattened spheroid, moderate, yellowish white to rosy red.

Eupsilia (Scopelosoma) satellitia, .65mm., hemispherical, moderate, yellow to dark reddish purple.

Lithophane (Xylina) semibrunnea, .70mm., hemispherical, fairly bold, pinkish, centre red.

L. (X.) socia, .65mm., flattened spheroid, fairly bold, white, markings red brown.

Graptolitha (Xylina) furcifera, no example.

G. (X.) lamda, no example.

G. (X.) ornithopus, .65mm., hemispherical, moderate, white with reddish markings.

Lithomoia solidaginis, .75mm., flattened spheroid, weak, cream to brown.

Xylocampa areola are notably high and very beautifully coloured with rosy red.

Cucullia are all very similar but *lychnitis* is much flatter than the others which are distinctly high and conical. The sculpture is not very bold and all are ornamented if fertile with small brown patches when mature.

The ova are all upright and the shells thin.

Xylocampa areola, width .80mm., shape conical spheroid, sculpture fairly bold, colour white with rosy markings.

Calocampa exoteta, no example.

C. vetusta, .85mm., flattened spheroid, moderate.

Cucullia verbasci, .70mm., conical spheroid, weak, pale green markings brown.

C. scrophulariae, no example.

C. lychnitis, .75mm., hemispherical, weak, semi transparent white.

C. asteris, no example.

C. umbratica, .80mm., conical spheroid, moderate, green with brown spots.

C. chamomilla, .50mm., conical spheroid, weak, white, markings red brown.

C. gnaphalii, .70mm., conical spheroid, fairly bold.

C. absinthii, no example.

C. artemisiae (abrotani), no example.

Anarta myrtilli, .70mm., flattened spheroid, weak, pale yellow.

A. cordigera, .75mm., flattened spheroid, rather weak, pale purple.

A. melanopa, .80mm., flattened spheroid, moderate, rosy brown.

Heliaca tenebrata, no example.

Chariclea delphinii, no example.

Pyrrhia umbra, .60mm., flattened spheroid, moderate, waxy white.

Heliopsis dipsacea, .50mm., flattened spheroid, moderate, white.

H. scutosa, no example.

H. peltigera, .50mm., flattened spheroid, weak, white.

H. armigera, no example.

Acontia (*Tarache*) *lucida* v. *albicollis*, no example.

A. (*T.*) *luctuosa*, .60mm., flattened spheroid, moderate, white, blotched pale purple.

Thalpochares ostrina, no example.

T. parva, no example.

T. paula, no example.

Hapalotis (*Erastria*) *fasciana*, no example.

Bankia (*Erastria*) *argentea*, .60mm., flattened spheroid, weak, greenish white.

Hydrelia (*Erastria*) *uncula*, .60mm., hemispherical, weak.

Erastria venustula, no example.

Rivula sericealis, no example.

Prothymnia viridaria, .55mm., flattened spheroid, weak, short spines at angles of sculpture, white, blotched red.

Emmelia trabealis, .45mm., conical spheroid, moderate, blotched brown.

GONOPTERINAE.

The sole representative of this group, *Scoliopteryx libatrix*, lays a large white egg singly on the leaves of its food plant. Pale green in colour with rather faint ribs and a very thin transparent shell through which the larval head can be seen before it hatches. Diameter .85mm.

QUADRIFINAE.

Plusia. Egg hemispherical. Not boldly sculptured but with many ribs and pale yellow in colour. That of *P. gamma* is noticeably smaller than the others in size.

Catocala. Our four British species are so different in the egg stage that they can be easily separated. *Fraxini* has about 18 straight ribs uniting a white ring around the outer circumference with the micropylar area boldly sculptured. *Nupta* 36 ribs and the white ring is not always visible. *Sponsa* has no ribs at all while the eggshell is mottled with purple brown.

Promissa 18 very bold ribs which are zigzagged very strongly and unlike any other egg I have met with.

Plusia moneta, width .70mm., shape hemispherical, sculpture weak.

P. chrysitis, .75mm., hemispherical, moderate, white, transparent.

P. chryson, no example.

P. bractea, .65mm., hemispherical, weak, lemon with 2 purple spots.

- P. festucae*, .75mm., hemispherical, faint, pale yellow.
P. iota, .70mm., hemispherical, weak, lemon yellow.
P. pulchrina, .70mm., hemispherical, weak.
P. ni, no example.
P. gamma, .55mm., hemispherical, weak, pale yellow.
P. interrogationis, no example.
Abrostola triplasia, .75mm., hemispherical, moderate.
A. tripartita, no example.
Euclidia mi, .70mm., flattened spheroid, weak, pale green.
E. glyphica, .75mm., flattened spheroid, moderate, green.
Pseudophia lunaris, 1.00mm., flattened spheroid, moderate, white, markings purple brown.
Catephia alchymista, no example.
Catocala fraxini, 1.20mm., flattened spheroid, bold, ring pale.
C. electa, no example.
C. nupta, 1.10mm., flattened spheroid, bold, brown, markings dark red.
C. sponsa, 1.40mm., flattened spheroid, smooth no ribs, marbled with purple brown.
C. promissa, 1.20mm., flattened spheroid, very bold, ribs zigzagged, purple brown.
Toxocampa pastinum, .70mm., nearly spherical, moderate.
T. cracca, .75mm., nearly spherical, moderate, pale purplish red.

HYPENINAE.

I have only obtained 5 of the species in this group as yet so cannot form a fair opinion as to the type of ovum to be expected, but I should think they would be highly interesting, as those I have done show marked differences in shape, sculpture and coloration.

The ova are all upright and the shells thin.

Taspeyria flexula, width .60mm., shape hemispherical, sculpture bold ribs, colour purple red.

Parascotia fuliginaria, .50mm., flattened spheroid, rather weak, pink.

Zantlognatha tarsipennalis, .65mm., nearly spherical, nearly smooth, yellow, markings red.

Z. grisealis, no example.

Z. (Sophronia) emortualis, no example.

Madopa salicalis, no example.

Hermينيا cribrumalis (cribralis), no example.

H. deivalis, no example.

Pechipogon barbalis, no example.

Bomolocha fontis, no example.

Hypena proboscidalis, no example.

H. obsitalis, no example.

H. rostralis, .60mm., hemispherical, bold, greenish white with tiny red spots.

Hypenodes taenialis (*albistrigalis*), no example.

H. costaestrigalis, no example.

Tholomiges turfosalis, .40mm., nearly spherical, almost smooth, yellowish white.

BREPHIDAE.*

The eggs of our two species *Brephos parthenias* and *B. notha* show such a wide difference as compared with other noctuid ova that I should be more inclined to put them with the Geometridae. I have not yet found the micropyle so cannot say whether they are upright or flat but they look to be flat and the ribs or corrugations run from end to end and are fairly bold. Colour green. *Parthenias* appears to have rows of pits between the ribs which do not seem to be present in *notha*. The egg of *B. parthenias* measure $.85 \times .40$ mm., that of *B. notha* $.70 \times .45$ mm.

* The *Brephidae* are now recognised by all our leading authorities as true Geometrids.

The Larva of *Dysstroma concinnata*, Stephens.

By E. A. COCKAYNE, D.M., F.R.C.P., F.E.S.—Read April 9th, 1931.

Whether *concinnata* is sufficiently distinct from *truncata* to be regarded as a species, or whether it is better to look upon it as a well-defined race, or subspecies, is a matter for the systematist to decide. Our classification is artificial and the status given to it is a matter of opinion and not of fact. Though there is some variation, all specimens of *concinnata* are very much alike in pattern and colour, and very different from English *truncata*, and true *concinnata*, is confined to Arran Island off the west coast of Scotland and to the neighbouring mainland. Some years ago I identified two *truncata* taken by Captain R. S. Gwatkin-Williams in Achil Island off the west coast of Ireland as *concinnata*, but Mr. Sheldon has taken a considerable number in this locality more recently, and says they differ from *concinnata* and are similar to some of the Hebridean and Sutherland forms of *truncata*. The chief claim of *concinnata* to rank as a species is based on the statement that ordinary *truncata* occurs on Arran and is double-brooded, whereas *concinnata* is single-brooded, and that the two forms remain quite distinct. The difference in elevation, *concinnata* being on the high and *truncata* on the low ground, might account for this, but even so *concinnata* might well be accorded subspecific rank. The differences in the genitalia taken alone appear to me to be very small and like the other differences from *truncata* they are probably due to the long period during which it has been isolated. In Seitz' "Palaeartic Macro-lepidoptera" it is treated by Prout as a species, and since the larva is not figured in Buckler's "Larvae of British Butterflies and Moths" and appears never to have been described, I think the following notes may be of interest. Mr. L. B. Prout kindly sent me about forty ova laid 7.viii.1929 by females taken at Brodick, Arran. The pale yellow eggs hatched 21.viii.1929 without any change of colour except that a pale grey spot marked the position of the head, and the young larvae were pale yellow before feeding like those of *citrata*. As I had no microscope I am unable to give a more detailed description. The larvae fed at first on *Polygonum aviculare* and changed skin, twice, I think, before reaching the hibernating instar. Up to this stage they remained pale green, but in this instar there were three fairly distinct forms.

(1) Pale green (lettuce green), with a slightly darker head lightly spotted with maroon, legs and prolegs green; a thin maroon lateral stripe on the middle of the first and second abdominal somites.

(2) Darker green (cerro green); head much darker and heavily irrorated with maroon; legs maroon; a thin complete maroon lateral stripe extending on to the first pair of prolegs and the anterior half of the second pair.

(3) Very much darker green; head almost entirely maroon; legs maroon; maroon lateral stripe very broad extending almost to the mid-line on the first thoracic somite, both pairs of prolegs maroon.

They reached this instar 11.viii. and stopped feeding 17.viii.

Twelve of the thirty-nine having died unaccountably on the latter date the survivors were placed on growing plants of wild strawberry in a cold room. They invariably rested high up with the body straight at an angle of 45° with the leaf or stem and with the head free, or with head, legs and prolegs attached, stretched straight out from leaf to stem or stem to leaf. They nibbled the leaves from time to time during the winter. On 14.xi. they were moved to fresh plants, but only thirteen were alive. The rest had probably been killed by a crab spider, which I found. On 22.ii. twelve were alive and feeding, and on 9.iii. some changed skin for the fourth time. In this, the penultimate instar, they all retained the maroon lateral stripe. On 14.iii. the biggest changed skin for the last time and two followed suit on the next day, and on 28.iii. and 31.iii. these were full grown. Others lagged behind, but the last was full grown in the first week of May.

The full-grown larva is slender and tapers towards the anterior end varying in length between 22 and 25mm. The dorsal surface has a ground colour of cerro green (Ridgway) with a continuous narrow central line of much darker green starting on the third thoracic somite. In one larva this dark central line is bordered on either side by an incomplete whitish green line, most distinct near the ends of the somites. According to Buckler the larva of *citrata* has the dark central line bordered with white, but not that of *truncata*. On either side of the ground colour of the dorsal region there is a distinct subdorsal stripe. This is pure white on the three thoracic somites; on the first thoracic it is sharply curved with the convexity inwards; on the second the subdorsal stripes are a little further apart and on the third still further apart, and on both these somites they are slightly curved with the concavity inwards. On the abdominal somites the subdorsal stripes are well defined, but tinged with yellow on the more anterior ones and with pale green on the more posterior. There is a broad continuous lateral stripe of Hay's maroon (Ridgway), or of a colour a little lighter or darker, starting in three larvae on the first and in the rest on the second or third thoracic somite. This stripe becomes broader in the middle of each somite where it may even

touch the subdorsal stripe, and narrower at the intersegmental areas, where the concavity formed below is filled in with very pale green. In most the lateral is separated from the subdorsal stripe by green ground colour. The ventral surface is green of a slightly paler tint than the dorsal, with a narrow central yellow line and with a thin greenish white line on each side of the anterior part of each somite ending at a point just posterior to the first pair of tubercles. Each intersegmental fold appears as a narrow yellow transverse line. In one larva heavily marked with maroon the four ventral tubercles of each somite are ringed with maroon, and there is a short line of the same colour in the middle of the venter between the first pair of tubercles, running forward to a point slightly anterior to them; in another larva still more heavily marked there are in addition extensions of maroon from the lateral stripes to all the rings around the ventral tubercles, excepting those on the first and second abdominal somites. In these two larvae two broad maroon bands run transversely between the first pair of prolegs and two narrower ones cross the venter between the first and anal pair. In one larva the lateral stripe is narrower and redder than in the rest, absent on the first and second thoracic, and reduced to a few specks of colour on the anterior part of the fourth, and the posterior part of the sixth and seventh abdominal somites where there is a thin white line above and a greenish white stripe below. On the eighth it is represented by a large, and on the ninth by a small, red spot. In most of the larvae the prothoracic plate has maroon markings; the first two pairs of legs in the majority are green and the third pair maroon: in two the maroon of the lateral stripe does not extend on to the base of the third pair but in the rest it does so, and in two of the most heavily marked all three pairs of legs and their bases are maroon. The whole of the first pair and the anterior half of the anal pair of prolegs are maroon even in the most lightly marked, and in the most heavily marked the whole of the anal pair is of this colour. The processes on the anal pair of prolegs are white or pale green dorsally and in every case deep pink laterally on both inner and outer aspects. The anal flap is divided almost equally into a central portion of cerro green and two very pale green lateral portions, the central being slightly the wider. The tubercles are white contrasting strongly with the maroon stripe and green ground colour and the setae appear to be dark red; the spiracles are white. The head including the mouth parts varies from cerro to a blackish green and has maroon markings as follows: a line running parallel with the division between the two lobes; six complete or broken lines at right angles to it following the curve of the vertex; four V-shaped markings with the apex pointing to the mouth parts and two dots or lines below, all on the front and outer aspect of the lobe; a vertical line running down to the ocelli, which are black, and two dots to the outer side of it. The front is

transversely ridged, entirely green, green with two maroon dots side by side above, or with these dots and a maroon band below as well.

Mr. Sheldon tells me that all his *concinata* larvae bred from the egg were like mine in having dark red or purplish stripes both during the hibernating instar and afterwards, but all the larvae from eggs laid by Achil *truncata*, though they had the red stripe during hibernation lost it afterwards and without exception became entirely green. Both broods were kept out of doors on growing plants of wild strawberry during the winter and were brought into the house into a cold room in the spring. The Achil larvae were also much slower in feeding and growth. *Concinata* is said to feed on heather, but there is no heather in Achil and the *truncata* there must feed on some greener plant, so that the different colour of the full-grown larvae of both is well adapted to match their surroundings. If they were the same species one would expect them to vary with their environment, for as a rule variability of this kind is dependent on the surroundings of the larvae especially during the second and third instars, a phase, or as the botanists call it an "epharmone." The surroundings in this case were the same, but the result totally different, and one must conclude that this was due to inherited factors. With regard to ordinary *truncata* Buckler says that larvae bred on sallow and strawberry had a pink or purple stripe in the hibernating instar, but many lost it later and the width and depth of colour was very variable in the larvae that retained it and their anal points were either pink or green. I have found the same variability in larvae found wild in the spring, even in those found on heather at Rannoch. At Braemar in June, 1931, I took 22 larvae, two green ones on bilberry, seven green ones and two with a complete red lateral stripe on nettle, two pure green ones, four with only a trace of pink on the last two somites, and two with a complete red stripe, on heather far from any other plants. This suggests that in the case of *truncata* the colour of the food-plant is at the most only of secondary importance in determining the colour of the larva. Careful experiments like those carried out by Poulton might yield interesting results and settle whether the colour is governed by inherited or environmental factors or by both. The habit of the larvae of sitting high up on their food-plant and of never leaving it, gives ample opportunity for the colour of the leaves and stems to influence the colour of the larvae if they are susceptible, and the fact that the two lots of *concinata* were so much alike and so different from Achil *truncata*, though all were kept on growing plants of strawberry and exposed to the light, suggests that the colour is largely, if not entirely, determined by genetic factors.

Below is a summary of the differences between the larva of *concinata* and *truncata*. If these and the pupal difference found

by Mr. Hawkins prove to be constant the claim of *concinata* to specific rank will be greatly strengthened.

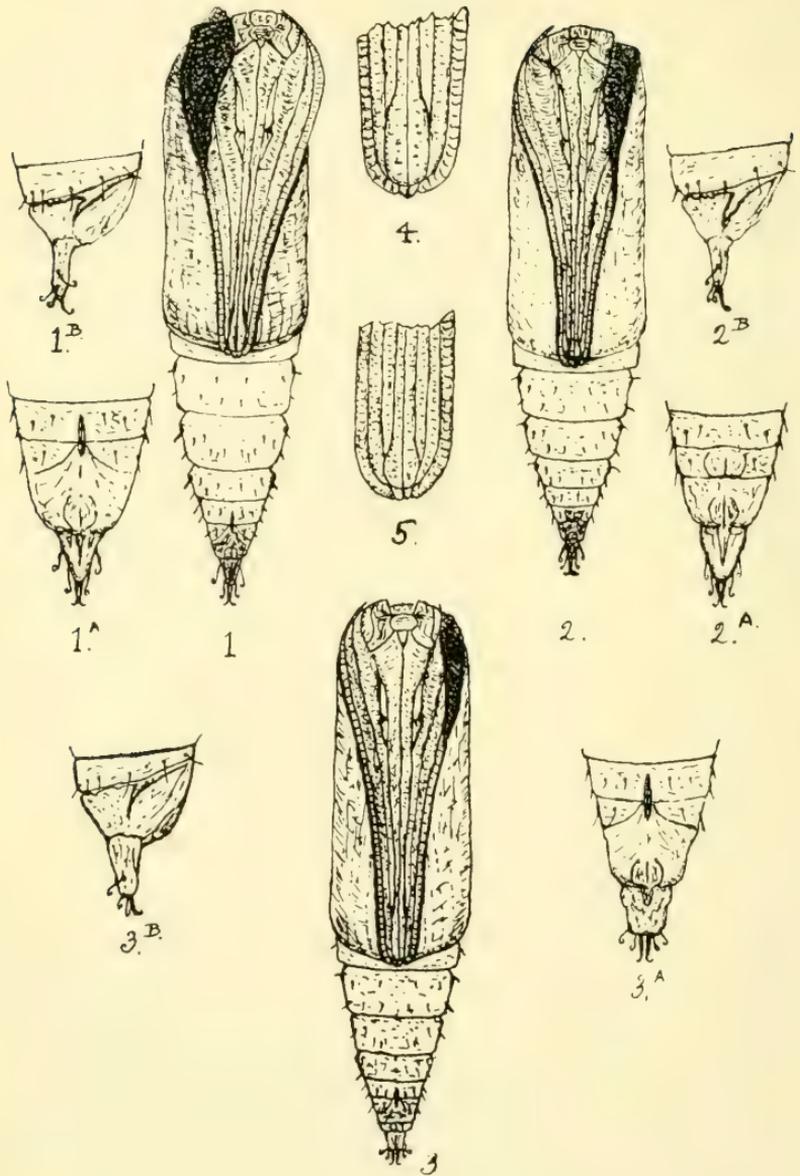
(1) Head. Markings maroon in *concinata*, even in the one with a broken lateral stripe. Lighter and browner in *truncata* and in the green larvae very pale brown.

(2) Lateral maroon stripe. Darker and broader in *concinata*, sometimes extending up to subdorsal line in the middle of the somite. Paler and less sharply defined above in *truncata* and not reaching the subdorsal line, often absent altogether.

(3) Subdorsal line. Very distinct on every somite in *concinata*. Indistinct even on the thorax and almost invisible on the abdomen in *truncata*.

(4) Central dark green stripe on dorsum, distinct and bordered with white in *concinata*, indistinct and without white border in *truncata*.

The longitudinal stripes and lines, which are so distinct in *concinata*, make it a much more beautiful larva than that of *truncata*, in which they are scarcely visible.



Del: C. N. Harvins.

EXPLANATION OF PLATE VI.

PUPAE OF THE SUB-GENUS DYSSTROMA, HB.

1, 1a, 1b. *D. concinnata*, Steph., ♀.

2, 2a, 2b. *D. truncata*, Hüfn., ♂.

3, 3a, 3b. *D. citrata*, L., ♀.

4. End of maxillae, etc., ♀.
(All three species.)

5. End of maxillae, etc., ♂.
(All three species.)

Nos. 1, 2, and 3 × 5. Nos. 4 and 5 × 10.

On the Pupae of the Sub-genus *Dysstroma*, Hb.

(With Plate VI.)

By C. N. HAWKINS, F.E.S.—Read April 9th, 1931.

I have made a detailed examination of pupae of the three reputed species of the sub-genus *Dysstroma*, Hb., *i.e.*, *truncata*, Hb., *citrata*, L. (*immanata*, Haw.), and *concinata*, Steph., to ascertain whether there are any, and if so, what, recognisable differences which might help to settle the vexed question of their specific distinctness.

Unfortunately the quantity of my material is not sufficiently large to enable definite conclusions to be drawn, but it seems worth while to record such results as I have been able to obtain in order to draw attention to certain details of structure where differences do appear to occur, so that they may be checked by comparison with much larger bred series when opportunity arises.

Thanks to the kindness of Dr. E. A. Cockayne, Mr. Hy. J. Turner and others I have received dehisced pupae of *truncata* from larvae obtained at Braemar and elsewhere, and of *citrata* from Rannoch. To these must be added specimens of *truncata* bred by myself from larvae obtained at Wimbledon and Horsley, of *citrata* from Horsley, and a single specimen of *concinata* bred from a larva received from Dr. Cockayne, one of several reared by him from ova obtained from an Arran ♀.

Even so, I have but 24 specimens of *truncata*, 4 of *citrata* and the single *concinata*, so that it is quite obvious that I can do little more than suggest points for observation in future.

The accompanying drawings (see Plate VI.) have been made to scale and are, I believe, fairly accurate delineations of the individuals they represent, which, so far as my limited experience goes, may be regarded as average specimens. As will be mentioned later, however, there is considerable variation. Figures 1, 2 and 3 show dehisced pupae of the three species respectively under a magnification of 5 diameters. It will be noted that the pupa of *truncata* is a ♂ while the others are ♀ ♀, but this does not appear to affect the points to which I wish to draw attention. Figures 1A, 2A and 3A show the ventral aspects of the respective anal extremities from (and including) the 8th abdominal segment and Figures 1B, 2B and 3B show the lateral aspects of same from (and including) the 9th abdominal segment. There are certain points of difference here to which, I think, special attention should be paid.

In *citrata* the cremaster in ventral aspect is comparatively broad and blunt (although not always so much so as in the specimen

illustrated) and the cremastral hooks are all placed near the extremity. As will be seen, the sides of the cremaster follow, in outline, two convex curves which may however be less prominent than here shown. In lateral aspect the cremaster is thick and clumsy looking.

In *truncata* the cremaster in ventral aspect is very variable. It may be broadest just beyond the base, (as shown) and then taper irregularly almost to a point, or the sides may be parallel for a very short distance beyond the base or they may even begin to converge so as to approach the concavity of outline shown in my single example of *concinmata*, but usually the outline tends to follow two convex curves as in *citrata*. In lateral aspect the cremaster is much more slender, flatter on the dorsum and more pointed than in *citrata*, while two of the cremastral hooks are placed considerably nearer the base of the cremaster.

In *concinmata* the cremaster, in ventral aspect, is widest at the base and tapers almost to a point with the sides slightly concave. The cremastral hooks are placed nearly as in *truncata* while in lateral aspect the cremaster is slender, as in *truncata*, but not so flat on the dorsum making it thicker and more blunt at the end.

All three species have four pairs of cremastral hooks, the centre pair stout, fairly long and hooked at the tips, while the other three pairs are fine, shorter and curled almost or quite into a ring at the tips. One pair is placed so far dorsally that it is often hidden from the ventral aspect.

All three species also have on each side of the 10th abdominal segment a depressed tooth-like mark, pointing toward the base of the cremaster which may be worth attention. It is, however, variable, and very difficult to describe. It can be clearly seen in Figures 1B, 2B and 3B where the differences shown must, I am afraid, be regarded to a great extent as individual rather than specific.

Figure 4 shows the extremity of the maxillae, etc., in a ♀ pupa, and Figure 5 the same parts in a ♂ pupa. The differences here shown are common to all three species and depend to a great extent on the length of the 1st (prothoracic) pair of legs which are longer in the ♂ than in the ♀. There is a certain amount of individual variation.

Other points to be noticed are that in *concinmata*, so far as my single specimen shows, Poulton's line is clearly marked as a very dark brown, almost black, wavy line, while in the other two species it is scarcely visible although in one specimen of *truncata* I have seen it faintly indicated in the same way for a short distance near the anal angle of the wing. My *concinmata* also has the pupal wings, antennae, legs, maxillae, and head parts brownish while in the other two species these parts are creamy white as are the abdominal segments in all three species.

Aquatic Hymenoptera.

By MRS. K. GRANT, F.E.S.—*Read November 12th, 1931.*

The Hymenoptera are one of the largest and most important orders of insects, comprising some 60,000 species with very varied life histories; but of all these only about twelve are so far known to be aquatic in habit, though since they are of very minute size, it is probable that many remain to be discovered.

The twelve aquatic species are all of them parasitic, and it is interesting to notice that among them are representatives of three of the four big superfamilies which are usually grouped together under the name "Hymenoptera parasitica," five of them belonging to the Chalcidoidea, three to the Proctotrypoidea, and four to the Ichneumonidae.

In view of their lightness, their small size, and their great delicacy when compared with most of the other aquatic insects, it is somewhat surprising that these Hymenoptera should have undergone so little change in structure to suit their life under water. In some of the species, it is true, the wings are considerably reduced or even absent, but in the main the modifications which have occurred are those of habit rather than form, and the adaptation of perfectly ordinary Hymenopterous behaviour to suit an aquatic environment shows some pretty instances of the flexibility of habit in the order. For example, many Ichneumonid larvae construct a stout cocoon in which they are able to pass the winter in adult form; *Agriotypus armatus* hibernates under water, where it needs air to breathe, and so by a simple modification of the ordinary cocoon, the larva spins itself a beautiful little diving jacket with a most ingenious aerating attachment.

Most of the larvae are internal parasites; as they live inside the bodies of their hosts, it makes little difference to them whether the latter are beneath the surface of the water or above it, but two species, *Agriotypus armatus* and *A. gracilis*, are external parasites of caddis worms—that is, they live outside the caddis, but inside its case. In this situation they are bathed in the water that flows through the case in much the same sort of way that the internal parasites are by the body fluids of their hosts, and they breathe in the same way, through their skins. It is therefore possible to imagine that their terrestrial ancestor may have been an internal

parasite, rather than an external one, though this, of course, is purely a matter of conjecture.

Although *Agriotypus armatus* was the first aquatic hymenopteron to be discovered, having been found on the Clyde by Dr. Walker just a century ago, and its identity as a parasite of caddis worms established a few years later, the attention of entomologists in general does not seem to have been aroused until the publication of a paper by Sir John Lubbock in 1863, giving an account of two species which he named *Polynema natans* and *Prestwichia aquatica*. The first of these is a Myrmarid, and parasitises the eggs of the pond skater. It is a very minute insect, being about a twentyfifth of an inch long, and four or five individuals may be found within a single egg of the host. The adults swim about with a slow jerky motion of their wings—in fact, one may say that they fly under water. They also walk about on plants and can pass through the surface film of water and move freely on either side of it. They can live for twelve hours in a bottle filled to the brim with water and tightly corked.

Prestwichia aquatica, the second of Lubbock's finds, is particularly interesting because it is the most highly modified of the aquatic Hymenoptera, and the most thoroughly aquatic of them all, never having been observed to leave the water. It has been known to live for five days completely submerged, and spends most of its time searching over sticks and plants for suitable eggs to parasitise—for it also, like the last species, uses as its hosts the eggs of water insects. It is not confined to one species, but may be found in the eggs of dragon-flies, water-boatmen, pond-skaters, and aquatic beetles. As many as thirty-four individuals have been taken from the big egg of the *Dytiscus* beetle! It undergoes the whole of its development in the egg in which it was born, not leaving it until it is ready to seek out new eggs to parasitise. Mating is even said to take place within the host egg when there are individuals of both sexes present. The male is wingless, the female nearly so, and both sexes swim about by means of their legs, which are covered with longish bristles and hairs.

Two species, which, like *Polynema*, swim with their wings, are *Hydrophylax aquivolans* and *Limnodytes gerriphagus*. *Hydrophylax* turned up quite suddenly in 1908 in an aquarium belonging to Dr. Needham. It belongs to the *Trichogrammidae*, and apparently parasitises the eggs of the dragonfly, but its early life-history is unknown. It is very small and has a somewhat torpedo-shaped body and long narrow wings fringed with hairs, which make convenient oars.

Limnodytes gerriphagus, as its name suggests, like *Polynema* is a parasite of pond skaters. It is a member of the *Proctotrypidae*, and has another relation which is also aquatic, *L. setosus*, but I have not been able to find anything out about that, except its name. The

eggs of the pond-skater are laid in rows on the underside of leaves, and when they are normal they contain yellowish embryos. Sometimes however, white ones may be found among them, and if these be examined under the microscope, the larvae of the parasite can be seen moving about within. In their first stage, these larvae are most peculiar looking creatures, rather like a baby wrapped up in a shawl, with a long tail hanging down below. The adults are fairly ordinary looking, and can use their wings either to swim with, or to fly in the air. Like their host, they are widely distributed, and have been found as far apart as Europe and America.

Another interesting insect is a Braconid species which parasitises the pupae of a fly, *Hydrellia modesta*, whose larvae live in the epidermis of the floating leaves of Potamogeton. The parasite eggs are laid in the larvae, but they do not hatch until the host pupates. The puparia of the flies are commonly found during the summer, and their length is 3 to 3.5 mm. Their colour is yellowish brown, and they are transparent, so that the parasites can be seen moving about inside them. Each puparium contains an air bubble for the use of the pupa, and the parasites avail themselves of this, since when they are full grown they bite their way out of the puparium and float up with the air bubble to the surface, where they arrive high and dry, ready to fly away. It is amusing to observe here one of the latest devices for escaping from a sunken submarine put into practice by an insect. Indeed it has become almost a platitude to say that man has hardly invented anything, from poison gas to the use of chemicals in preserving food, which has not been in use by some insect or other . . . in some cases the insects seem to be ahead of us still.

The last two species of which I am able to give a fairly full account are *Agriotypus armatus* and *A. gracilis*. The first of them is found in all parts of Europe, the second in Japan, but they are so alike in appearance and habit that one description must suffice here for both of them. They attack caddis worms of the family Goerinae while they are in the pupal or the quiescent prepupal stage, the female *Agriotypus* crawling down into the water by means of any partly submerged object (she cannot swim) and searching over the bottom for a suitable caddis case. Having found one that looks right to her, she gives the larva a sharp poke through the hole at the tail end of the case, to see whether it is active or not. If it is, it jerks the case forward in its alarm at this rough treatment, and the parasite leaves it, but if it remains motionless, she lays an egg by thrusting her ovipositor between the grains of sand of which the case is composed. The egg has a flexible stalk by which it is attached to the skin of the host. This stalk keeps it from being washed away by the current of water which the caddis keeps in motion through the case by movements of its abdomen. When the larva first hatches, it is a curious little beast with two long tails

and a formidable arrangement of hooks and bristles on its head and body, by means of which it is able to move itself about until it finds a suitable spot where it can settle down to the great business of the next stage, feeding up. After a few days it sheds its skin, and is seen to be a soft maggot-like creature with a well developed head and two curved hooks on the last segment of the body. In this stage it remains for some weeks, growing rapidly at the expense of its host, until the latter is consumed, and the parasite is ready for another change of skin. The third stage is very like the second, saving that there are two large dark patches on the head, which may easily be mistaken for eyes. It pokes the remains of the caddis down to the bottom of the case, and partitions them off with a wall of silk. It then spins round and round inside the front part of the case until it has made a stout cocoon, at the top of which it constructs a lid. Through this it pokes a long silken appendage that looks like a miniature bootlace. This bootlace is full of cotton-woolly silk, the interstices of which, together with the case itself, become full of the gases given out by the larva, and osmosis takes place through the surface of the "bootlace," bringing in fresh oxygen from the brook to replace the carbon dioxide which the parasite respire, and so the insect is supplied with the oxygen it needs during the eight months it spends inside the cocoon. Finally a very delicate white lining is spun to the cocoon, and the larva becomes quiescent for a while, during which it gets thinner and thinner at the waist as the pupa forms within. At last the hind intestine, which has not up till now been connected with the rest of the gut, is evacuated, and pupation takes place. The pupal stage lasts for a month, and the perfect insect emerges about the end of September. It does not, however, leave the case until some warm day at the beginning of the following April.

There are still one or two species left which I have not mentioned, but so little of these is known that I should only be able to give a list of names. I think however that I have said enough to show that the aquatic Hymenoptera are among the most interesting of insects, and are well worth the attention of the general entomologist. They are probably much more common than is generally supposed, and anyone who finds insect eggs which look a bit abnormal would do well to keep them for a while to see if anything interesting will appear in the aquarium.

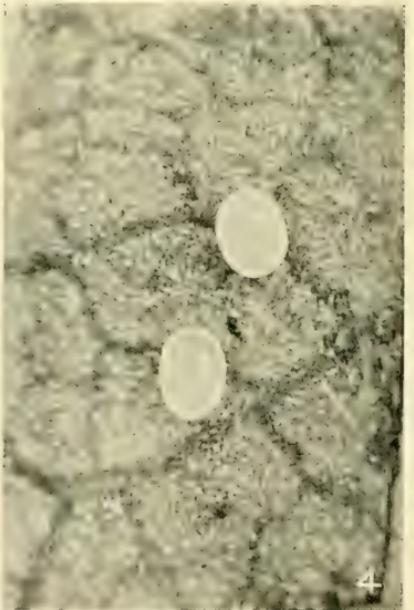
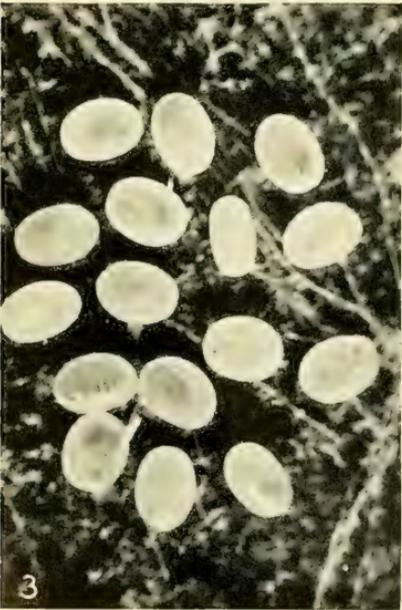


Photo: A. E. Tonge.

EXPLANATION OF PLATE VII.

1. *Agdistis bennetii* (Agd.) ova.
2. *Oxyptilus parvidactyla* (Platyp.) ova.
3. *Alucita pentadactyla* (Alucit.) ova.
4. *Leioptilus tephradactyla* (Alucit.) ova.

The Basis of the Classification of the British Plume Moths (Pterophorina).*

By HY. J. TURNER, F.E.S.—*Read January 14th, 1932.*

PRELIMINARY REMARKS.

A quarter of a century ago, in March, 1905, the late J. W. Tutt read a short paper before the Society on the then position of our knowledge of the British Plume Moths, and when published the paper included a List of the Species then considered British, some 31 in number. The following year there appeared Volume V. of Tutt's great work on the *British Lepidoptera*, containing the natural history of 19 species (including a newly identified species) and leaving the remaining 13 to be dealt with in a subsequent volume. Unfortunately the completion was never achieved. Tutt felt that the vast amount of material concerning the British Rhopalocera, accumulated by himself and others during the previous twenty years, must be prepared for publication, and he went on to write of our butterflies. Again unfortunately before he could complete his new task, he had passed away.

It has always been my desire to see the completion of this work on the Plumes, and at Tutt's death Mr. H. Page and I searched his large mass of manuscript notes. All those papers relating to the Butterflies were passed on to the Rev. G. Wheeler to complete the Volume XI. of "British Lepidoptera" in hand; but nothing whatever concerning the Plumes was found.

Knowing that the late Dr. Chapman had notes on the remaining species, I more than once urged him to complete and publish them as the second volume on the Plumes. He, however, could not see his way to do this. First because he foresaw that it would probably be financially a loss, and secondly because the band of enthusiastic workers whom Tutt and he had interested in the group, had been broken up and there seemed to be no successors.

At the end of 1921 Dr. Chapman, too, passed away. The whole of his MS. papers came into my hands and what he had collected and observed concerning the thirteen remaining species of Plumes, books, slides and imagines are still in my possession, awaiting someone who will deal with the life-histories in the thorough encyclopedic way of Tutt and Chapman.

Passing from these more or less personal matters, let us see what advance, if any, has been made in the study of the Plumes since 1906 when Vol. V. of "British Lepidoptera" was published.

SYSTEMATIC POSITION.

In his 1905 paper, Tutt referred to the suggestion of Jordan in 1869, that the Plumes were related to the Pylalids and not, as had

* This paper was illustrated by numerous very excellent photographs kindly lent by Mr. Tonge, and with imagines, diagrams, microscopic slides, etc., from the material left by the late Dr. T. A. Chapman.

hitherto been considered, to the Tineids. He said that Chapman and others, however, had shown that there was no foundation whatever for this assumption of Jordan, and that although subsequent writers had blindly accepted the suggestion as fact without any evidence, the Plume-moths were "an isolated and separate superfamily, peculiar in their structure, their natural history, and their habits." And it seems we may still say that the systematic position of this group "on scientific evidence, based on all their stages" remains a problem.

Let us go back for a moment.

In a notable paper in the "Trans. Ent. Soc. Lond." for 1893, Dr. Chapman discussed the Pupal Structure of the Lepidoptera. Therein he showed that the Pylaloid and Pterophorid pupae were fundamentally divergent, the former belonging to the Obtectae, with smooth and rounded, externally solid pupa, the free segments 5th and 6th in both sexes, and dehiscence by irregular fracture; the latter to the Incompletæ, with less solid and less rounded pupa, with appendages often partly free, the free segments 4th, 5th, 6th, 7th in the ♂ and 4th, 5th, 6th in the ♀, and dehiscence accompanied by freeing of the appendages and segments previously fixed.

These pupal structures and habits seem to point to a systematic position of the *Pterophorina* or "Plumes" between the Obtectae (macro major division) and the Incompletæ (micro major division). The Pupae do *not* progress and emerge from the cocoon like the rest of the Incompletæ but are stationary in their cocoons as those of the Obtectae. And in his suggested natural classification of the Lepidoptera, Chapman so placed the "Plumes" in the first section of the Incompletæ, to which they are related by the bulk of their characteristics, but emphasised their intermediate position by putting all the remainder of the Incompletæ in another section.

In a subsequent paper, "Trans. Ent. Soc. Lond.," 1895(6), Dr. Chapman dealt with the Classificatory Position of *Orneodes*, the "20-plume moths," and by comparison of oval, larval and pupal structures showed conclusively that they have no relation whatever to the real "plume moths" and are undoubtedly wholly "obtect" in their systematic position.

The Systematic Position of the "Plumes" may be summarised as follows:—

LEPIDOPTERA.—HETEROCERA.—PUPAE.

- A.—**Obtectae.**—Pupa smooth and rounded; externally solid; free segments in both sexes 5th and 6th (abdominal); never emerges from cocoon, or progresses in any way; dehiscence by irregular fracture; ova mostly upright. [Most of the Macros, the Pylaloids, many of the Micros, *Orneodes*.]
- B.—**Incompletæ.**—Pupa less solid and rounded; appendages often partially free; free segments may extend to 3rd (abd.); 7th always free in ♂ and fixed in ♀; dehiscence

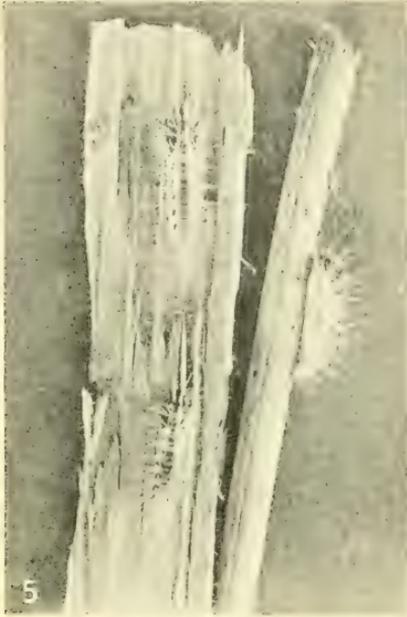


Photo: A. E. Tonge.

EXPLANATION OF PLATE VIII.

5. *Pselnophorus brachydaetyla* (Alucit.) pupa.
6. *Porrittia galactodaetyla* (Alucit.) pupa.
7. *Leioptilus tephrodaetyla* (Alucit.) pupa.
8. *Porrittia galactodaetyla* (Alucit.) larva.

with freeing of segments and appendages previously fixed; (except in 1) pupa progresses and emerges from cocoon; ova mostly flat.

- 1.—Pupa attached by cremaster; never emerges from cocoon; free segments 4th, 5th, 6th, 7th in ♂ and 4th, 5th, 6th in ♀; ova flat. [Pterophorina.]
- 2.—Pupa free to move and emerge from cocoon.

[Many of the *Micros*; *Zygaenidae*; *Zeuzera*; *Hepialus*; *Cossus*; *Sesiidae*.]

NOTE.—The Pterophorid pupa is attached by a peculiar cremaster on two segments (8th and 10th abdominal); often takes up a position at right angles to its attachment.

CLASSIFICATION.

Let us now turn to a consideration of the four stages of the Pterophorina and see how their characteristics have helped in the grouping of the species, and in passing, note what investigations of life-histories have been already done and what still remain for future workers.

I.—The Ova of the Plumes belong to the flat section, *i.e.*, their longitudinal axis is horizontal and their micropyle is at one end. By their general shape they can roughly be divided into three groups.

1. The flask-shaped. 2. The more cylindrical. 3. The more oval. These divisions form part of the evidence upon which Chapman and Tutt based their Family Divisions the *Agdistidae*, the *Platyptiliidae* and the *Alucitidae*. Mr. Tonge's admirable photographs show these divisions (Plate VII.).

II.—The Larvae of the Plumes equally fall into a threefold division on general larval structure and habits, in line with the divisions based on the characters of the Ovum.

The larvae of the family *Agdistidae* readily separate themselves from those of the rest of the Plumes. They have fleshy protuberances on the bases of the tubercles, the thoracic tubercles are very small and equally spaced; the larvae have caudal horns and both thoracic and abdominal segments possess more or less developed horns. They are exposed feeders throughout and hibernate when young probably in the ante-penultimate (3rd or 4th instar) as Chapman describes a larva in the 3rd or 4th stage in October as being 4.5mm in length and another in May 6.6mm. in length in the penultimate instar. Whereas in the rest of the Plumes, *Alucitidae* and *Platyptiliidae*, they are devoid of such protuberances, the tubercles are unequally spaced, they have no caudal horn and they mostly hibernate in the 1st or 2nd instar.

The larvae of the remainder of the Plumes fall roughly into two sections, and support the division already suggested by the ovular characters.

The larvae of the one section are comparatively shorter and thicker, in shape more cylindrical, with a paucity of hairs in

quantity and development, with tubercles simple, and the skin-hairs very fine and short often appearing pilose. These are the larvae of the *Platyptiliidae*.

The larvae of the other section are somewhat longer and flatter in shape, the thoracic plate is abundantly haired, the tubercles form complicated warts, and there is also an almost complete absence of skin-hairs. They are the larvae of the *Alucitidae*.

Buckler's "Larvae" Vol. IX. contains descriptions of figures of plume larvae and pupae. On plt. CLXIII. there are figures of larva and pupa of the Agdistid *A. bennettii* and also figures of larvae and pupae of eight Platyptiliid species, while on plt. CLXIV. there are figures of larvae and pupae of nine of our Alucitid species.

III.—The pupal characters in a very general way support the threefold grouping, but not so strongly as in the cases of the ova and larvae. In the *Agdistidae* the pupa is especially long, slender and smooth, with but little tendency to assume the humps so prominent in the larvae. For the most part the pupae of the *Platyptiliidae* are smooth and have points with setae instead of warts and hairs while those of the *Alucitidae* are hairy and are well supplied with warts instead of tubercles. (Plate VIII.)

IV.—Finally, turning to the Imago, the *Agdistidae* being without the clefts in the wings are at once differentiated from the rest of the Plumes, although otherwise agreeing in shape, structure and appendages with the others. It is generally accepted that this separation is a natural one for classification.

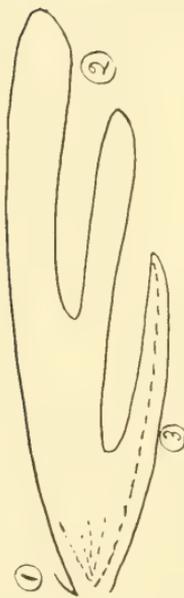
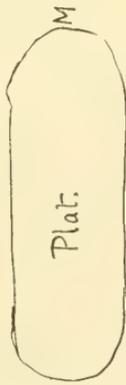
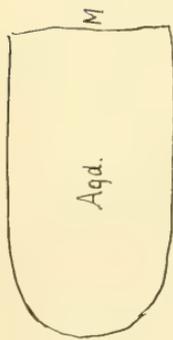
The suggestion which follows from what has been said of ovular, larval and pupal structures and characteristics has been to divide the Alucitides into two sections, the *Platyptiliidae* and the *Alucitidae*, and we find in the imagines numerous strong characters in support of this same division. The former family, the *Platyptiliidae*, has the hindwings with the first cleft not deeply cut and the third plumule has only one nervule, the anal one, while in the ♀ there is only a single spina to the frenulum. The latter family, the *Alucitidae*, has the hindwings with the first cleft deeply cut, and there are two nervules in the third plumule, while in the ♀ there is a double spina to the frenulum. (Plate IX.)

SUMMARY.

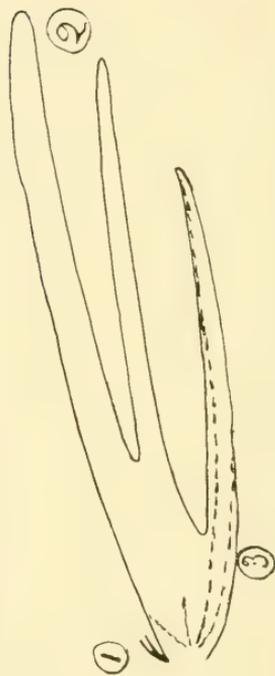
Thus in all four stages the structures and characteristics strongly point to three well-defined families in two groups. The group AGDISTIDES with the one family *Agdistidae* and the group ALUCITIDES with the two families *Platyptiliidae* and *Alucitidae*.

These subdivisions are well seen in the List as published in our "Proceedings" of 1905, which arrangement Tutt carried out as far as he went in Vol. V. of his "British Lepidoptera." The main divisions seem to be on quite natural grounds and based upon the consideration of all stages and structures including a certain amount of confirmatory evidence from the genitalia, which last

Plat. ♀ h.w.



Alucit. ♀ h.w.



Ova of the Three Groups
of Plume Moths.
M = Micropyle.

1. Frenulum (spina).
2. Cleft in h.w.
3. Venation in 3rd feather of h.w.

Del.: H.J.T.

structure has not yet been fully explored, but when worked out I do not anticipate the suggestion of any striking alteration in this classification.

ALUCITIDES.

PLATYPTILIIDAE.

- Oxyptilia*.
 (*Capperia*).
heterodactyla (*teucrui*).
 (*Oxyptilus*)
pilosellae (*hieracii*).
parvidactyla.
 (*Crombruggia*)
distans.
Trichoptilus (*Buckleria*)
paludum.
Platyptilia
 (*Fredericina*)
calodactyla (*zetterstedtii*)
 (*taeniadactylus*).
tesseradactyla.
 (*Platyptilia*)
isodactylus.
gonodactyla (*trigonodactyla*).
 (*Gillmeria*)
ocheodactyla (*dichrodactyla*).
pallidactyla (*bertrami*).
 (*Eucnaemidophorus*)
rhododactyla.
 (*Amblyptilia*)
punctidactyla.
cosmodactyla (*acanthodactyla*).

Marasmarcha
lunaedactyla (*phaeodactyla*).

- Stenoptilia*
 (*Stenoptilia*)
pterodactyla (*fuscus*).
 (*Adkinia*)
bipunctidactylus
 (*plagiodactylus*).
zophodactylus (*loewii*).
graphodactyla.

ALUCITIDAE.

- Pterophorus*
 (*Oidaematophorus*)
lithodactyla.
 (*Emmelina*)
monodactyla (*pterodactyla*).
 (*Porrittia*)
galactodactyla.
 (*Leioptilus*)
tephradactyla.
 (*Ovendenia*)
septodactyla (*lienigiannus*).
 (*Hellinsia*)
osteodactylus.
carphodactyla.
Pselnophorus
brachydactyla.
Adaina
microdactyla.
Alucita
 (*Alucita*)
pentadactyla.
 (*Wheeleria*)
spilodactylus.
niveidactylus (*baliodactylus*).
 (*Merrifieldia*)
tridactylus (*tetradactyla*).

AGDISTIDES.

AGDISTIDAE.

- Agdistis*
 (*Adactylus*)
bennetii.
staticis.

The genera in brackets are Tutt's alternative or supplementary genera which may, or may not, stand in the final revision whenever undertaken. The 13 *Alucitidae* and *Agdistis staticis* have yet to be dealt with.

NOTES ON AUTHORS' TREATMENT OF THE PLUMES SUBSEQUENT
TO CHAPMAN AND TUTT.

The authors who have dealt with the Pterophorina other than individual species since the publication of Tutt's Vol. V. are Spuler (1906) European species, Barnes and Lindsey (1921) N. American Fauna, and Meyrick (1928) British Fauna only.

1. Spuler divides the Plumets into the same three sections including the same genera but shows the influence of Staudinger's "Catalog" (1901) rather than that of Meyrick (1895), although his divisions are largely based on the venation, but with different results.

2. Barnes and Lindsey's classification agrees in the main with Tutt's in that their diagram of phylogeny shows *Agdistis* by itself and the other genera in two groups corresponding to our *Platyptiliidae* and *Alucitidae* without cross over of any genus. The Nearctic Plumets are so similar in every way to our European species that they properly fall into the same genera.

3. Meyrick, on the other hand, although he separates the plumets with uncleft forewings, the *Agdistis*, from the remainder, has ignored all other suggestive characters from the four stages, in spite of the accumulation of facts laboriously worked out by Chapman, Tutt and many other workers, preferring rather to go on in his old mechanical way (in which he follows Staudinger), at the same time telling us that "the whole has been carefully revised and corrected in the light of all available information." Meyrick's work may be the perfection of mechanism for the identification of typical exponents of species, but when the identification is made, one gets no further from suggestion or association in the study of entomology.

CONCLUSION.

Thus we find that the study of the Plumets has been at a standstill for more than a quarter of a century, and even what was then done is to a large extent ignored, most of our writers preferring to follow the old and long out of date arrangement based on few or no facts rather than on a classification compiled from a comparative study of all the four stages of the creatures' lives.

ANNUAL ADDRESS TO THE MEMBERS
 OF THE
 South London Entomological and Natural History
 Society.

Read January 28th, 1932.

By K. G. BLAIR, B.Sc., F.Z.S., F.E.S.

LADIES and GENTLEMEN. From the Reports of the Council and the Treasurer which have just been read, you will, I think, have some cause for satisfaction with the present financial position of the Society, and our thanks and congratulations are particularly due to our Treasurer for the gradually better financial position which we are now reaching.

There can be no doubt but that the prosperity of any Society such as ours depends largely upon its body of officers and it is to its advantage that these officers should hold their positions for extended periods of service. It is only by so doing that they become familiar with the intricacies of their business and secure the uniformly smooth running of the machine. Ten years have now elapsed since I last had the honour of occupying this position. During that time Mr. Syms has succeeded Mr. Dods in the office of Hon. Librarian, but has now been there some years and has proved himself every bit as capable as his predecessor. Now we have another change; Mr. Stanley Edwards, after thirty-eight years as one of the Secretaries of the Society, a position which is far from being a mere sinecure, feels compelled to hand over the reins to younger and more vigorous hands, but I am sure you will agree with your Council's action in nominating him as one of our Honorary Members in some slight recognition of the services he has rendered and the long years that he has devoted to the Society's welfare. In his successor, Mr. Jacobs, we have a hard-working and enthusiastic member, with a keen interest in one of the less studied groups of our fauna, and I feel sure that we can with confidence leave the conduct of the Society's business in his hands.

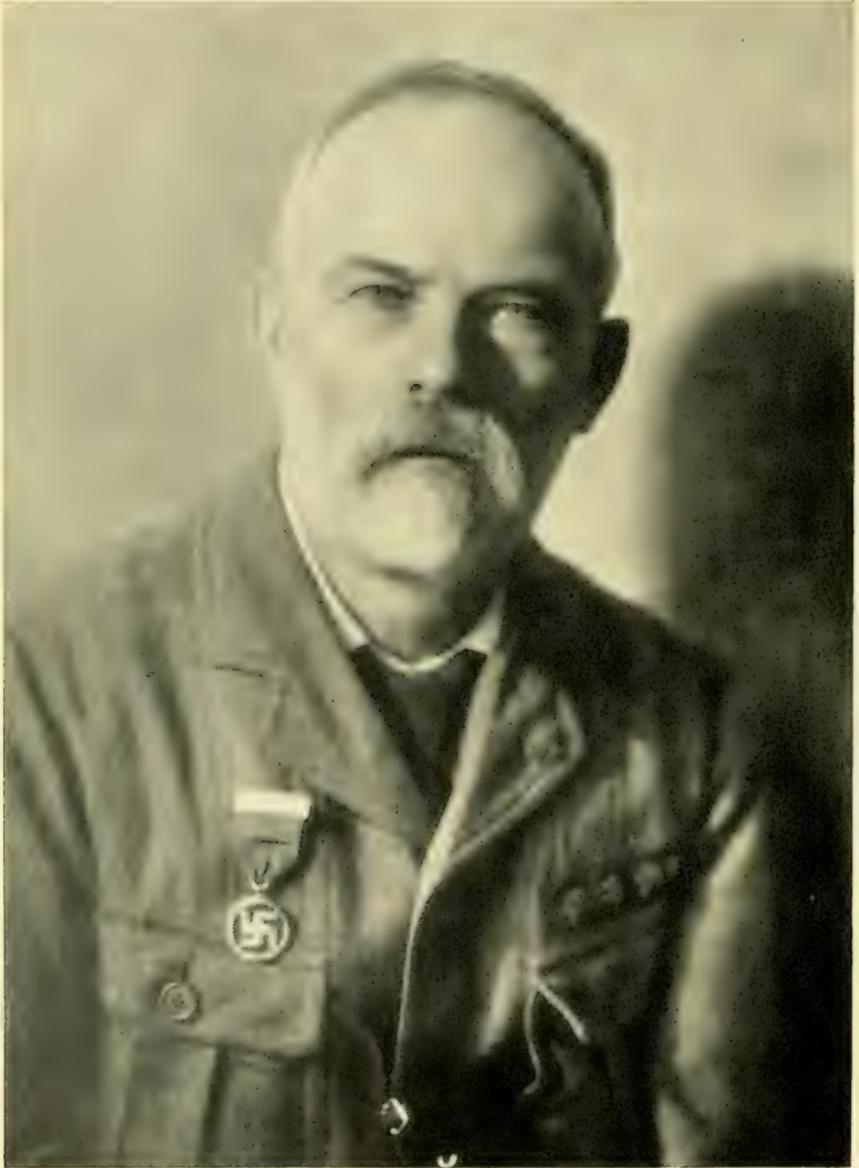
There are however certain features with regard to our position which we cannot regard as satisfactory, one of these being the limited space at our disposal for our collections and library. With regard to both these features we appear to have reached a point where further extension is impossible, and additions, other than the filling of vacancies in the collections, can only be made at the cost of disposing of material of less value to make room for them.

Attendance at the meetings has continued to be good though not quite up to last years' average, and I think the standard of papers read and exhibits made has been quite up to normal. I have been glad to note, too, more of the younger members coming forward with exhibits, and would remind them, and others, that the interest of an exhibit does not depend upon its rarity; rarity indeed is only one feature, and that a minor one, in the interest afforded; but notes on occurrence, habits, affinities, and such like, add very much more interest to an exhibit than the mere fact of its comparative rarity. I would appeal once more to exhibitors to keep in mind our Annual volume of Proceedings when making an exhibit, and to hand in to the Secretary a full account of it in the form in which they would like it to appear in the Proceedings. This volume is a valuable medium for placing such observations on permanent record and the more it is so used the more is its value enhanced.

The attendance at the Field Meetings on the other hand leaves a good deal to be desired; the falling-off is causing the Council no little anxiety, and they would be glad to receive suggestions from members of means to be adopted to counteract it. This year no doubt the lack of support was due at least in part to the phenomenally bad season, and it is hoped that the coming year will see an improvement both as regards weather and attendance.

The toll upon our membership taken by death in the past year has been three, somewhat below the average as regards numbers, but heavy indeed is the loss inflicted upon us.

Edward Step, our oldest and all but original member, twice President and President designate for the coming year, died on Nov. 8th, within three days of his 76th birthday. Known to all of us as a constant exhibitor at our meetings, a frequent reader of short notes on a wide variety of subjects, our authority upon questions botanical, a regular attendant at and leader of our Field Meetings, —his last appearance among us was at the Field Meeting at Box Hill on July 25th last,—his loss is a severe blow indeed to the



*Photo: H. P. Hider,
Kingston-on-Thames.*

W. J. Lucas.

Society. And we are not alone in this loss, for he was a prominent fellow of the Linnean Society, President of the B.E.N.A., and to a very much wider public he was known through his numerous books upon many aspects of wild nature.

William John Lucas, another past President, died suddenly at Ringwood on January 5th. Best known as an authority upon two of our smaller orders, the Odonata and Orthoptera, his books upon these will long remain standard works upon these sections of our fauna. He was a frequent contributor too of very useful papers on these groups and the Neuroptera to our Proceedings and annually summarised the records of these orders in "The Entomologist." A master at Tiffin's School, Kingston on Thames, and a batchelor, he took a keen interest in the Boy Scout movement, and would not infrequently bring one or more of his boys to our meetings and Field Meetings. Since his retirement some twelve years ago he had spent much time every year in the New Forest and his appearances among us have been somewhat rare; it was in his beloved New Forest that he died. (Plate X.)

Major C. E. Liles took perhaps but a dilettante interest in entomology, but was a fairly regular attendant here and at our Field Meetings. At an earlier age he was an athlete of considerable eminence, and possessed I believe a long series of cups and other trophies mainly of the cycle-track.

It has long been our custom that at this Annual Meeting the retiring President should embody in his address the consideration of some subject in connection with our studies, but I propose, with the approval of the Council, to vary this procedure slightly this evening.

As you know, our lamented friend Edward Step was our President designate for this coming year, and among the papers left at his death was found the address that he had prepared for delivery a year hence. I think that he probably felt that he might not survive the year, or at any rate that he might not so retain his powers and activity as to be able to prepare and himself deliver this address at the due time, so that he would at least prepare it while still able, even if it should have to be read by deputy when the time came. After due consideration the Council have decided that this address should be read, and that the most fitting occasion for reading it is this evening. The words that follow therefore are those of our friend even though the voice that should have spoken them is still.

S.L.E. AND N.H.S. 1872-1932.

It has been suggested to me that, instead of the usual Presidential Address at the end of my term of office, I should try to tell you something of the early days of the Society. To some extent the story has been told already in his Presidential Address in 1908, by my friend Robert Adkin, who knew something of the preliminary meetings at Edward Newman's house which led up to the formation of our Society.

For the benefit of those whose membership does not date back so far and who may not have this volume handy for ready reference I will recapitulate Mr. Adkin's remarks. He was referring to the Entomological Club, that very select little body limited to eight members, each of whom invites entomologists to a supper once a year. In those days they used to possess a collection of insects which was housed by one of the members, with the proviso that it should be open to inspection by entomologists one evening a week. At this time Edward Newman was the member having custody of the collection and at his house entomologists would meet one evening a week. "It was at these meetings at Mr. Newman's house in Peckham that the idea of forming an entomological Society or club for South London was conceived. Messrs. J. Platt Barrett, J. G. Marsh, T. N. Hoey, and W. West (of Greenwich), were frequent visitors at them, and after talking the matter over for a year or two these conspirators met at Mr. Barrett's house to consider the matter. Nothing very definite appears to have been settled at this first meeting, but at a subsequent one, also held at Mr. Barrett's house, when some eight gentlemen attended, including the above-mentioned four, and Messrs Boden, Champion, Cowley, and another, it was resolved to seek a suitable meeting-place, and to enrol members. Thus, in March, 1872, the South London Entomological Society was founded—the direct outcome of the venerable Entomological Club."

I knew nothing of these beginnings, not having any friends with the slightest interest in Entomology; and the first I knew of what was afoot was through reading a news-paragraph in the *South London Press*, stating that such a society was being formed and that upon a certain Thursday a meeting was to be held at Dunn's Institute, in Newington Causeway, when all persons interested in the study would be welcomed.

I thought the invitation included myself, so attended that meeting; to which came two other lads about my own age, but we were all

strangers one to another. After the business and exhibits had been disposed of, we three were interviewed by J. Platt Barrett, the Secretary, with a view to our becoming members. I remember his asking me how long I had been interested in insects, and my telling him eight or nine years. "And how old did you say you are?" he asked, looking through me. I told him I should be seventeen in the coming November; and then followed questions as to the insects I had gained some slight knowledge of.

The other two—Harold Moncrieffe and D'Arcy Power—were interrogated in the same fashion. Power had the distinct advantage of being the son of Dr. Henry Power, a well-known coleopterist at that period, and Moncrieffe's uncle, Sir Thomas Moncrieffe, was also known as an entomologist. Barrett appeared to think we were promising stuff, and undertook to nominate us and get us seconded. At the meeting following we were elected, not quite unanimously for I heard later that Boden, who was the elderly man among the founders, doubted the wisdom of electing a parcel of boys!

The three youngsters naturally gravitated one to another, and we had several collecting trips to Streatham Common, Dulwich fields, etc. But the other two did not remain members very long. Moncrieffe's interest turned more to geology, and Power went up to Oxford University. My position was not an easy one. All the original members were known each to the others; and I, of necessity, kept in the background, becoming very conscious of my supreme ignorance, unable to contribute anything of value to the discussions, or to exhibit specimens worth showing: because I was not a collector, and cannot call myself one to-day.

It is a risky thing always, to give full scope to the ancient member to indulge in his memories of the far past: you never know how wide he will open the flood-gates, nor what trivial incidents have assumed importance in his memory, whilst to you they may appear merely childish or boring. I am afraid some of you will find it so this evening.

Although I was one of the first batch of members to be admitted to the Society after its definite formation, I can see now that I was quite unsuitable for membership, and the Society far too advanced as a body of collectors to be of much use to me at the time; I should have waited a few years.

When Platt Barrett interrogated me on the number of years in which I had been interested in insects, and I told him eight or nine, he was looking at the matter from the collecting point of view; I

was answering in the sense of an interest in insects as living things. The truth is that my interest began in butterfly-worship at the age of eight, when an elder brother who had been on business to Gipsy Hill—then on the edge of the country—brought me a living *Vanessa urticae*. With the aid of a moistened knob of sugar, I kept that butterfly alive for about a fortnight, feasting my eyes on its beauties of form and colour. Thenceforth I was always on the look out for winged insects; and I learned that they could be reared from caterpillars. I think my first experience in breeding was with *Orygia antiqua*, whose larvae were so abundant on the plane-trees in the Temple and Lincoln's Inn Fields, and of whose urticating hairs I had unpleasant experience thus early.

I should explain that I was a young cockney, born and living in the parish of St. Clement Danes: so that up to my fourteenth year my entomology was restricted. A few small gardens were still left to some of the older houses away from the main streets, and from these a few butterflies and moths came abroad. An old nurse had relations in Lambeth, where some of the small houses had long flowery gardens within sight of the river. Occasionally, she took me there by steamboat; and I had an hour or so's observing and collecting in the garden. A little later, when I went to school, one of my mates was a son of the gardener of the Middle Temple; and this fact gave me the entry to the garden in the evenings and holidays. There were many common insects to be found there. One day Mr. Dale, the gardener, had a serious talk with me upon the matter: he approved what I was doing, and regretted that he knew little more about insects than that they spoiled his plants. He said that he had a book on the subject (which he appeared never to have read), and if I would like to read it he would lend it to me. The book turned out to be Duncan's *British Moths and Sphingex*, one of the original volumes in Jardin's Naturalists' Library. I borrowed it again and again, learning from it the names of many moths with which I was acquainted already, but anonymously. Then I became possessed of Coleman's *British Butterflies*, with its wonderfully good illustrations.

About this time, I got into the habit of spending summer weekends with an aunt and uncle near New Cross; and so learned my way by lane and field-path to Brockley, Loam pit Hill and Catford. The brickfield ponds at Loam pit Hill afforded abundance of insect life of various orders, as well as newts and snails, all matters of interest to me. A little beyond were several old willows whose

trunks were riddled by the larvae of the Musk-beetle. At the proper time these splendid beetles were to be seen in numbers on the bark. I have never since seen so many of them at one time as I did there. These field-path rambles, with New Cross as a base, led the way to the longer walks of later years that made me fairly intimate with the unspoiled tracts of Mid-Surrey.

This, then, was the preliminary grounding which formed the eight or nine years covered by my reply to Barrett's enquiry. Barrett, of course, was looking for members who would be able to throw their more systematic experiences into the common pool of the Society's knowledge; I am afraid that I looked forward to the Society as a pool of knowledge into which I could dip freely though unable to add anything in my turn. But the wall that for a time seemed to separate me from the more experienced members existed only in my imagination; such as it was, it was broken down by several lucky accidents.

One day whilst hunting in the Dulwich lanes, I had to take shelter from a storm; and whilst held up under a tree I caught sight of a pretty grey bug on the bark. I boxed it and, knowing nothing of hemiptera, submitted it to Champion at the next meeting. He told me its name—which I have forgotten long since—and asked where I took it. It was interesting, because the species had not been recorded previously from East Surrey. I begged him to keep it; and its capture went on our record. This was the beginning of a friendship between Champion and myself that lasted through his life.

In somewhat similar fashion, I established a long friendship with J. R. Wellman. He had been exhibiting some of the beautifully set *Acidalias* of his own breeding, when some one asked if he still found Knotgrass an acceptable food for the larvae. "They have been doing well on it," he replied, "but, unfortunately, I have been making such inroads on my supply that I fear I shall not be able to keep them going."

It was the custom, after the meetings, for a number of us to walk together as far as the "Elephant and Castle," when Barrett, Marsh and Trimmer Williams turned off down New Kent Road; Champion, and I think Hoey, took the Walworth Road; and Wellman and I passed along Newington Butts. So far, I had hesitated to attach myself to so exalted a person as the President; but on this evening I ventured to ask if he was really wanting Knotgrass? Indeed, he was! I told him I could show him a patch a little further on.

In those days, between Newington Church and Kennington Lane a number of houses had small forecourts, long since covered by shops. These were occupied by plantain and garden marigold, nobody considering them worth keeping trim. One was filled with Knotgrass, which I had noticed in passing twice a day; Wellman also passed it twice a day, but had never seen it. His joy was evident as I held the gate whilst he gathered a liberal armful of the weed. I walked with Wellman up the Clapham Road that evening and left him at his door at Stockwell; and for years after I took the same walk after our meetings, if the weather was fairly good. A little later, at his suggestion, I got into the habit of calling for him at Trig Wharf, and we went to the meetings together. The awkward part of the matter was that at the next meeting, when the President announced that his *Acidalias* had been saved by the interposition of "our young member, Mr. Step," some of the members got the idea that I was a botanist, and thereafter brought me some of their feeding troubles. At that time, I knew nothing of botany, and could name only a few wild plants which were the food of larvae I had reared. Looking back, I think I must have resolved sub-consciously that it was my duty to know more of the British Flora.

When we were told that our meeting-room was needed for the growth of Dunn's Institute, and were given short notice to go, I was asked by Champion, then Secretary, if from my knowledge of the district around the "Elephant" I could suggest or find a new room. This turned out to be another bit of luck leading to my incorporation with the family. A few days later, a friend, Mr. Eve, who lived in West Square, asked how the new society was going. I told him our trouble, and said how glad I should be if I could find a suitable place. "Well," he said, "you know our dining-room! If you care to make use of that until you get proper quarters you are welcome to it." So, on being turned out of Dunns', we held a number of meetings at Mr. Eve's, until we got established at 104 Westminster Bridge Road. Mr. Adkin is of opinion that we kept the latter address for about six years, and I daresay he has found justification in the records; but relying only on memory, I should say our term was much shorter. At that time, however, I missed many meetings through being away travelling for my firm. It was a comfortable room above one of the better-class eating-houses—now extinct—which was supported mainly by the clerical staff of Maudslays, the engineers, whose works adjoined. I do not remember why we left; but I think the room was needed for meetings of a more distinctly religious character than our own.

Fortunately, as it seemed, there had been opened recently a new building, the South Metropolitan Temperance Hall, near St. George's Circus, where rooms were available; and there we flitted. It was whilst here that the Royal Aquarium schism occurred. Carrington, who had been appointed "Naturalist" to this pseudo-scientific theatre of varieties, organised a Great National Exhibition of Insects which was supported warmly by some of our members, whilst others thought it was *infra dig.* for a scientific society to be mixed up with music-hall turns and side-shows. There were warm discussions, and some resignations followed. The effect on our attendance was more marked when Carrington held weekly entomological meetings of his own, for this took away others and kept recruits from us. We were at the Temperance Hall two years or less, when Billups, who had begun to be active, found us a room in the New Kent Road which was quite all right but for one thing: the house had a long front garden which took it so far back from the pavement that the door was in darkness and the number could not be seen. Members failed to find the meetings, which grew smaller and smaller, and no doubt would have come to an end had not a few of us given a mutual undertaking to attend every time unless prevented by illness. I remember that in this pact were included our staunch old Curator, Wm. West, Arthur Bliss, the Secretary, R. Standen, V. R. Perkins, Billups, Chaney and myself. At that time and for many years after I held the post of Treasurer, which did not involve the care of large sums but the raking in of small ones.

In this connexion, Mr. Tonge may be interested in the reminder that we began with a subscription of 6/- per year, which was payable monthly; and that the Treasurer had a little account book ruled off into thirteen columns against the members' names. Some soon got into the habit of paying quarterly; and then we made it payable yearly. It was many years before we increased the subscription to 7/6; and then we gave old members the option of continuing at the original rate.

Although the New Kent Road meetings were small, they were quite harmonious and enjoyable. The few who attended regularly made a point of bringing exhibits which evoked a fair amount of after comment. The genial R. Standen had a very varied collecting experience upon which he could draw, and Major Ficklin was a good second. V. R. Perkins had a great store of knowledge of the Hymenoptera, which formed his principal exhibits. In his den

behind the Pimlico wine-shop, I spent several pleasant evenings running over his collection. His nephew, Dr. R. C. L. Perkins, carries on his good work among the Hymenoptera; and in our own society it is a pleasure to include J. F. Perkins, the son of R.C.L. as a third-generation hymenopterist from the days of which I am speaking. Jenner Weir was only an occasional attendant, but then always enlivened our meetings from a very extensive store of knowledge, of which Darwin himself had been glad to make use. I ventured to say to him one evening that we should much like to see him more frequently; and he explained that, owing to our meetings being on alternate Thursdays they clashed frequently with those of the Linnean, which were restricted to the first and third Thursdays in the month. Thereupon, I suggested to the Council that we should be content with two meetings every month, and that these should be fixed for the second and fourth Thursdays. At the next Annual Meeting this alteration was made, and has been continued to date. The result was that Jenner Weir became a very regular attendant.

It was whilst we were in the New Kent Road premises that what I have always regarded as the most important turning-point in the history of the Society occurred: we admitted to membership Messrs. Robert Adkin and Richard South, whose entry was followed by that of a number of other good and useful men. Instead of our numbers any longer showing a decrease, they began to increase and have continued to do so steadily from then until now. Among other things, we were emboldened to get out into the gaslight, finding quarters at what was called a Coffee-palace in Blackman Street, Borough. It was considered a great improvement, but I confess that I never thought so, the most interesting thing about it to me being that our Orthopterists could always rely upon getting a series of the small cockroach (*Blattella germanica*) in all stages, for there were endless columns of them climbing the wall of our meeting room—the most distinctly entomological one we had enjoyed. Our stay here was rather brief; and we received a hint that it would be advisable to remove our property at once, for the bailiffs were about to take possession.

For a few weeks we were without a home whilst several of us scoured the district in search of desirable rooms. These were found at last in Layman's Auction Rooms, 1, Denman Street, by London Bridge station. This was hailed as a great improvement, especially by those who went home by train; and there was space sufficient

in which to hold exhibitions—a feature that had, perforce, been neglected for a number of years. The room was a bit cheerless for all that; and after two or three years the prospect of greater comfort offered at the Bridge House Hotel, over the way, took us thither. It was convenient for those in want of a refresher after an exhausting meeting; but the place was in such great demand for concerts, balls and banquets, that we never knew when we reached the Bridge House whether we should meet in the ball-room or in the bar-parlour.

That being so, when a few influential members contrived to get us accepted as sub-tenants at Hibernia Chambers, in 1890, many of us were very glad. The satisfaction appears to have been so general and lasting that we have remained for more than forty years. There we have really been able to grow, our Library and Collections expanding to a size that would have been impossible in most places apart from ownership or a leasehold interest.

To Mr. Step's paper was appended the Meetings-card of the Society for 1882 when their headquarters were at 94, New Kent Road. The Officers were:—T. R. Billups, *President*, J. R. Wellman, *Vice-President*, the *Council* consisting of A. Bliss, W. C. Chaney, G. Elisha, V. R. Perkins, G. P. Shearwood, J. T. Williams and W. West (Streatham). *Hon. Curator*, W. West (Greenwich); *Hon. Librarian*, P. J. Lowry; *Hon. Treasurer*, E. Step and *Hon. Secretary*, H. Cubison. The meetings were still on alternate Thursdays and only the dates of meetings and Council Meetings were announced.

Ladies and Gentlemen, it now only remains for me to thank you sincerely for the signal honour you have done me in electing me again as your President. I am only too sensible of the many deficiencies in the service I have been able to render. To the Officers and Council and particularly the Vice-Presidents I must also tender my deep appreciation of the great kindness with which they treated my long absence during the summer and undertook the extra work thus thrust upon them.

Finally it is my very pleasant duty to extend a hearty welcome to our new President, Mr. T. H. L. Grosvenor, another old-timer with past experience of the Office. Under his experienced guidance I am sure we can look forward with confidence to the continued prosperity of the Society.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 12th, 1931.

Mr. E. STEF, F.L.S., VICE-PRESIDENT, in the Chair.

Mr. A. A. W. Buckstone exhibited ova of Lepidoptera and pupae of *Pararge aegeria*, which had been attacked and partially destroyed by mites.

Mr. C. N. Hawkins exhibited *Erannis defoliaria* from Epping Forest one being much suffused with dark coloration except at the outer margin. Also *E. aurantiaria* from the same area, one exceptionally deep orange with much emphasised transverse lines, another irregularly banded with dark shading, and another on which the bands were represented by dark fine lines.

Mr. Hugh Main exhibited a larva of *Prionus coriarius* (Col.) found in an old pine stump at Bocking, Essex. He had placed it in one of his terraria and explained his method of keeping the food and surrounding quite free from mould yet sufficiently moist for the larva to keep in healthy living condition.

Dr. Cockayne showed a bred specimen of *Xanthorhoë* (*Coremia*) *quadrifasciata* scaleless except for the fringes which were normal, and called attention to a recent paper by Kühn and Henke (*Abhandl. d. Gesellsch. d. Wissensch. z. Gottingen, math-physikal. klasse, n. f. bd. 15. 1929.*). These authors bred large numbers of *Ephestia kühniella* and found that scalelessness was inherited, but was due to three recessive characters. Of those recessi those homozygous for the first two had more or less symmetrical scaleless patches on fore or hind-wings, but when homozygous for the third also they were completely scaleless, without even the fringes, thus differing from most of the macrolepidoptera with absence of scales. They examined the pupa cases and found that the scales had been developed, but shed before emergence.

Mr. S. Wakely exhibited a series of *Thera juniperata* from Riddlesdown, showing typical form and two specimens of a dark variety. The darkest specimen was taken in 1926—the others in 1930. He also showed a series of *Colotois* (*Himera*) *pennaria* bred from larvae

taken at West Wickham in 1930, showing wide range in colouring and markings.

Mr. S. N. A. Jacobs exhibited a number of the beetle *Cis bilamellatus* found in *Polyporus* at Bromley and also a larva of *Borkhausenia pseudospretella*.

Mr. Glegg exhibited the following exotics:—*Papilio polyctor* and f. *ganesa*, *P. clytia*, *Parnassius charltonius*, *P. delphius* f. *albulus*, *P. hardwickii* and *P. apollonius*, all belonging to the Indian fauna.

Mr. T. H. L. Grosvenor gave an account of his journey in Waziristan and Afghanistan during the War and illustrated his discourse by a large number of lantern slides of the scenery.

FEBRUARY 26th, 1931.

Mr. E. STEP, F.L.S., VICE-PRESIDENT in the Chair.

Mr. T. G. Howarth, of Muswell Hill, and Mr. J. A. Thompson of Llandudno, were elected members.

Mr. C. N. Hawkins exhibited branches of ash with borings of the larva of *Zeuzera pyrina* (*aesculi*) showing signs of the attacks, made probably by some bird which had been unsuccessful, around the emergence hole, but attacks had been made at the other end of the bore where the pupating larvae was, and had been successful. He also showed another branch split open to exhibit the living pupa in its puparium at the top end of the bore.

It was reported that a lepidopterous larva had been found in the rind of an orange; in another instance larvae had been met with in the centre of the orange.

Mr. R. A. R. Priske communicated the following note.—

“On a piece of land in Ealing, where building has started in a new road, I saw, in the first week of October a very large number, probably some hundreds, of larvae of some species of Telephorid (Col.) beetle. On the first occasion of seeing them they seemed to be travelling with the wind, which was at the time rather strong, but at other times when I saw them they seemed to move at random. I have seen those larvae at intervals up to the end of February, but in continually diminishing numbers. I am quite at a loss to account for this incident and should be glad of any suggestion.”

Mr. Hugh Main exhibited a flashlight photo of a badger sent to him by a friend in Worcestershire. By a mechanical arrangement of threads and a set camera the animal had been made to take his own portrait; a remarkably successful one.

Mr. J. F. Perkins exhibited a long series of *Epinephele jurtina* from Devonshire and for comparison from S.E. Ireland, the latter series being dark and well marked with fulvous. A ♀ specimen from Co. Tyrone had the hindwings much suffused with fulvous. He also showed the well-marked form of *Pieris napi* from S.E. Ireland.

Mr. W. R. Parkes exhibited a short series of *Lasiocampa quercus* reared from larvae obtained after hibernation in S. Devon in 1930. One female specimen was of especial interest as the upper side of the right forewing showed a practically uniform brownish-yellow coloration extending all over it, but tending to be darker towards the outer-margin. The usual cross bands and the white spot were absent. The omission of the markings was not due to any lack of scales, as these were present in about normal numbers. The venation, and the markings on the underside of the wing were normal. The other wings were normal in all respects.

Mr. S. Wakely exhibited a series of *Malacosoma castrensis* bred from larvae taken near West Mersea, Essex. The larvae observed feeding wild were all eating Sea Plantain (*Plantago maritima*). The series showed much variation, dark and light forms, dark banded forms and others with transverse dark lines.

Dr. Cockayne exhibited *Frannia defoliaria* from Epping Forest, including a form with a very unusually shaped transverse dark band, curious speckled forms and others well-marked.

Mr. D. L. Glegg exhibited models of the cross-sections of the scales of the following four subspecies of *Ornithoptera priamus*, subsp. *croesus*, subsp. *arruana*, subsp. *urillianus* and subsp. *euphorion*.

Mr. Niblett exhibited a series of the minute gall-wasp *Callirhytis glandium* bred from galled acorns of *Quercus cerris* collected on September 10th, 1926. The emergences took place as follows, 1 on 29.iii.28, 2 or 3 on 24.iii.29, several on 27.iii.30 and 26.iv.30, and another nearly ready to emerge on 25.ii.31. In emergence no boring is made through the cup but a channel is cut between the acorn and the cup, the cells of the gall-wasp being at the base of the acorn.

He also exhibited a seed pod of *Lotus corniculatus* containing the orange coloured pupa of a beetle. It was supposed to be that of a species of weevil.

Dr. Bull exhibited an unusual aberration of *Diacrisia sannio* (*russula*) from Broadwater Forest, 1930, in which the black marginal band of the hindwings was almost absent but a dark suffusion of the basal half of the wing was present.

Mr. Arnold W. Hughes exhibited a series of *Lasiocampa quercus* and var. *callunae*. The specimens were bred in recent years from Wallasey larvae. It was at first thought that the olive forms (var. *olivaceo-fasciata*, Cockerell, and the ♀ var. *olivacea*, Tutt) were produced by black larvae with very dark brown hairs. Further investigation showed that every black larva did not produce an olive coloured moth and on the contrary an odd typical larva collected by a schoolboy did produce the variety *olivaceo-fasciata*.

The only conclusion reached was that the larvae vary as well as the imagines and if black larvae are found amongst typical ones there is a possibility or even a probability that larvae gathered from that brood (either typical or otherwise) will produce one or more varieties of the moth. Only 37 moths were bred. Of these 5 were olive forms and two others might be described as intermediate. The larvae were wild. No bred imagines were paired for experimental purposes. On one occasion 18 selected black larvae were sleeved with mosquito netting on willow. The cocoons and pupae were ravaged in the "sleeve" by a tiny parasitic fly and not one survived. He also exhibited a yellow var. of *Nemoria vividata*. It was captured on Meathop Moss, Witherslack, June, 1922. It was seen alive in the net by Mr. H. Dobson of Kendal and killed at once with ether. It was probably the var. "*canariensis*."

Mr. R. Adkin exhibited living examples of the Fire-brat or Baker's-brat (*Thermobia domestica*), a species closely allied to the Silver-fish (*Lepisma saccharina*). He said that a colony of the former species had taken up its abode in a wall at the back of a hot water boiler in his house at Eastbourne, and the individuals were often to be seen of an evening disporting themselves in the neighbourhood of the boiler and an adjacent sink, but he had been quite unable to discover anything in regard to their feeding habits.

MARCH 12th, 1931.

The PRESIDENT in the Chair.

The decease of a member, Major Liles, was reported.

Capt. Curwen reported as follows on a case of a Lepidopteron, *Tineola biselliella*, attacking Telephone Exchange Wiring, and exhibited the insect and sections of the wiring showing extensive depredations, which however are so far confined only to one station.

"An unusual trouble has recently been encountered by the Post

Office at one of its large London exchanges due to the attack by larvae on woollen braided wire covering. The insect responsible is *Tineola biselliella*.

"The infestation is apparently confined to what is known as the main distribution frame, which consists of a large iron skeleton rack about 40 ft. long \times 12 ft. high \times 6 ft. wide, divided into several horizontal tiers on each of which the wiring is laid to a depth of about 1 ft.

"At the present time there are about 15,000 pairs of wires in use; the wires themselves consist of tinned copper, lapped with pure rubber strip, followed by white wool wrapping and finally a woven woollen braiding.

"They are twisted in pairs with the outer braidings dyed red and blue respectively, the whole being rendered fireproof by impregnation with size. It has been estimated that about one half of the wires have been attacked by the larvae, and, when first discovered, it was possible to shake out enormous numbers of larvae together with masses of woollen debris and excreta matted together with larval silk. At a point of attack the textile covering is usually eaten completely through to the rubber, and the maximum completely stripped length which has been observed is about 3 inches.

"An interesting feature is that at any particular point the attack is usually more pronounced on one colour than the other. It is thought, however, that the larva might naturally confine itself to that wire of the twisted pair on which it commences feeding.

"The cause of the infestation can only be attributed to chance as the conditions obtaining apparently do not differ from those in many other large telephone exchanges.

"An investigation of the question is being carried out at the Post Office Research Station at Dollis Hill, with a view to developing extermination methods suited to the special requirements of the case; these must have a first regard for the electrical insulation of the wiring.

"It has been definitely ascertained that when the larvae have passed the feeding stage they will attack material of other than animal origin for the purpose of building the pupal casing, and a specimen built of white cotton yarn has been obtained."

Mr. Niblett exhibited a number of Chalcid parasites on the eggs of Lepidoptera, and ova which had been attacked by them.

Mr. A. E. Tonge gave the 2nd portion of his "Notes on the Ova of Lepidoptera" on this occasion dealing with the British Noctuae,

illustrating his remarks with a series of very fine lantern slides. (See pp. 1-15.)

In the discussion which ensued Dr. Cockayne noted that the oval characters apparently were of little or no help to classification within the Noctuid group.

MARCH 26th, 1931.

The PRESIDENT in the Chair.

Mr. Eagles exhibited the ova of *Strymon quercus* in situ on the terminal twigs of oak, found wild on Ranmore Common.

Mr. A. J. Wilmott, F.L.S., gave an interesting lecture, "Plant Collecting in Spain" illustrated with a long series of lantern slides.

APRIL 9th, 1931.

The PRESIDENT in the Chair.

Mr. E. R. Herrmann of Twickenham was elected a member.

Mr. C. de Worms exhibited ova of *Ruralis betulae* found in Huntingdonshire, 30.iii.31; a female *Xylina semibrunnea* taken at sallow bloom in the New Forest, 4.iv.31; *Dasycampa rubiginea* taken at sugar in Berkshire, 7.iv.31; two pairs of *Lycia hirtaria* taken in S. Kensington, 9.iv.31; and a female *Pteropis bistortata* taken at the same time as the last.

Mr. Niblett exhibited the gall caused by the fly *Cecidomyia (Perrisia) taxi* on the yew, which contained a lepidopterous larva, probably that of *Batodes angustiorana*, a Tortrix.

Mr. F. J. Coulson exhibited the following species of Hemiptera taken on Esher Common on March 23rd last. (1) In the Black Pond, *Notonecta glauca* with v. *furcata*, *Corixa geoffroyi*, *C. sahlbergi*, *C. limitata*, *C. distincta*, *C. moesta*, *C. fossarum*, *C. nigrolineata*, *C. praeusta*, and *C. bonsdorffi*. (2) From grass hummocks on the heath, *Miris calcaratus*, *Nabis ferus*, *N. ericetorum* and *Peritrechus luniger*. (3) On the water surface of ditches, *Velia currens* undeveloped form. 15 species in all.

Dr. Bull exhibited the living larva of *Aventia flexula* beaten from yew at Broadwater.

Mr. Stanley N. A. Jacobs exhibited the larva, pupa and imago of *Eucosma pflugiana*, Haw., together with a stem of the Marsh

Thistle (*Cirsium palustre*), which had been inhabited by these larvae, but which, during the rigorous months of winter, had been opened by small birds in search of insect food. These openings in many cases extend unbroken from almost the top to the bottom of a two feet or even three feet stem, but in spite of the apparent thoroughness with which the birds have opened the stems, in many stems so opened, one, two or even three larvae have been found. For pupation the larva eats a chamber half in the woody part of the stem, with an emergence hole through all but the outer skin which will have rotted away before the imago is due to appear. The back of the cocoon is constructed of silk and pith fragments. In the stems that have not been attacked by birds, a surprising number of larvae may be found; eight or ten may inhabit one stem, and four have been found in as many inches.

Mr. C. N. Hawkins exhibited series of *Lithosia griseola* bred from ova and contributed the following note.—

“On January 8th last I showed full-grown larvae of *Lithosia griseola*, Hb., reared from eggs laid by a ♀ of the *stramineola*, Dbd., form, taken at our Field Meeting at Byfleet on July 26th last year. Since then I have bred 15 imagines and it may be of some interest to show these and record the results so as to complete the story.

“26 ova were laid and all hatched. Of the resulting larvae 2 escaped and were lost, 2 were preserved and 6 died from some disease when nearly full-grown. One pupa also died. The remaining 15 produced the imagines shown. As will be seen, these consist of 7 typical *griseola* (4 ♂♂ and 3 ♀♀); 5 apparently typical *stramineola* (3 ♂♂ and 2 ♀♀); and 3 aberrant ♂ specimens, which can best be described as *stramineola* with nearly symmetrical patches of the *griseola* colour on the forewings. These patches differ in size and depth of colour on the three specimens, but in all, they appear to spread from or from near the outer margin towards the base of the wing, avoiding the costal and inner marginal areas. In the most heavily marked specimen the patches cover about two thirds of the area of each forewing, but in the others they are smaller.

“The pupae were kept in a warm room and the imagines emerged on and between January 20th and February 14th.”

Mr. S. Wakely exhibited a series of *Hibernia marginaria* reared from ova laid by a female of the ordinary type, which was found at West Wickham, Kent, in *copulā* with a male of the var. *fuscata* form. Of 34 specimens which emerged, 13 males and 6 females

were of the ordinary form ; 7 males and 6 females were the *fuscata* form ; and 2 females were intermediate. No males were bred of an intermediate form.

Mr. K. G. Blair exhibited bred examples of *Agdistis staticis*, Mill., together with *A. bennetii*, Curt., for comparison. While *A. bennetii* is a salt-marsh insect, the larva feeding on *Limonium vulgare*, *A. staticis* occurs on the sea cliffs of our south-western counties, the larva occurring on *L. binervosum*. This clivicolous form was first known in this country from the cliffs of Portland, Tutt first describing it as *A. bennetii* var. *portlandica*. Meyrick, in his "Revised Handbook of British Lepidoptera" (1928), accorded this form specific rank, at the same time re-naming it *A. clivicola* ; but the larva remained unknown, or at least undifferentiated from that of *A. bennetii*. The identity of the species with the Mediterranean *A. staticis* has only just been recognised (*vide* "Ent. Mo. Mag.," April, 1931, with Plate.)

The moth closely resembles *A. bennetii* but is as a rule slightly smaller though a certain amount of overlapping occurs ; it is rather greyer, less ochreous in colour, and the black spots on both wings and body are more prominent ; the genitalia are remarkably different, the last ventral plate of each being figured at above reference. The differences in the larvae are more apparent even than those of the moth, particularly in the form of the subterminal horn. In *A. bennetii* this is a long single structure while in *A. staticis* it is replaced by a pair of much shorter humps. The larvae of the two species were discussed in some detail by Tutt ("Brit. Lep." Vol. V. 1906), who regarded them as representing different genera, though he did not suspect the identity of *staticis* with his var. *portlandica*.

Mr. W. J. Ferier exhibited the Beetles *Dermestes vulpinus*, Fab., and *Corynetes rufipes*, Fab., found in association and in great numbers in a case at the London Docks, containing human remains en route from Karachi to a university in the U.S.A. The interesting point is that some years ago an Egyptian mummy was being unwrapped for some reason and was found to contain a number of *D. vulpinus* which were also accompanied by *C. rufipes*. The similarity of habit was perhaps worth recording.

The President remarked that both these beetles were commonly to be found about dried animal remains, such as old bones, skins, hoofs, etc. ; while the *Dermestes* were purely carrion-feeders *Corynetes* had been shown to be sometimes predaceous upon carrion-feeding larvae. *C. rufipes* was well-known as the "Kopra" beetle, and

frequently swarmed where this commodity was stored. The larvae, though able to thrive upon the Kopra, would also prey upon other insect larvae there present.

There was a short discussion on the British species of *Dysstroma*, *D. truncata*, *D. concinnata*, and *D. citrata (immanata)*, to which Dr. Cockayne, Messrs. Eagles and Hawkins contributed, illustrating their remarks by series of the various forms.

Mr. C. N. Hawkins contributed notes on the pupae of these species.

Subsequently Dr. Cockayne and Mr. C. N. Hawkins arranged their notes in the form of a paper. (See p. 16).

APRIL 18th, 1931.

FIELD MEETING—EFFINGHAM.

Leader—HY. J. TURNER, F.E.S., F.R.H.S.

Several members went down the old willow-fringed lane under skies threatening rain. Beyond obtaining abundance of willow catkins and a number of small larvae very little else was worth noting. The walk was continued across the wood and meadows on to the Effingham Common and another old lane was located amidst the meadows. The whole district looked promising for future work. Subsequently the Hemiptera and Coleoptera taken by Mr. Coulson were exhibited at our meetings and the capture of the uncommon *Eriocrania kaltenschachii* attached to hazel was also recorded.

APRIL 23rd, 1931.

MR. C. N. HAWKINS, F.E.S., in the Chair.

Mr. Downes exhibited a series of *Hibernia leucophearia* from Wimbledon Common, showing much variation and including the very dark-black and other forms.

Mr. Niblett exhibited the following species of *Cynipidae* bred from oak galls:—(1) *Neuroterus ostreus* emerged 14.xii.30 including one apterous example. The gall is known as the "oyster" gall and is on the underside of the midrib and its branches; the alternate generation is *Spathegaster aprilinus* which galls the terminal and axillary buds and is known as the "April Bud" gall. (2) *Aphilothrix quadrilineatus* emerged 12.iii.30 and 20.iii.31. This species galls the staminate catkins of oak, the galls being known as the "Furrowed

Catkin" gall. Those bred were from the same batch of galls. (3) *Aphilothrix fecundatrix*, from the axillary and terminal buds of oak, which are known as the "Artichoke" gall. They emerged 8.x.30 and 20.iii.31 from the same batch of galls.

Mr. C. N. Hawkins, exhibited a series of *Selenia bilunaria*, Esp. showing (a) the ♀ parent, taken at Wimbledon Common on March 31st, 1930. (b) 12 specimens of the 1st generation (summer form, *T. illunaria*, Esp. nec Hb.) bred from ova laid by the above mentioned ♀. These emerged June 16th to 19th, 1930, and include 3 ♂♂ and 9 ♀♀. (c) 1 specimen, a ♂, of the above mentioned 1st generation which did not emerge with the others but passed the winter as a pupa and emerged indoors on January 6th, 1931. This specimen is very dark, in fact darker than any of the 2nd generation mentioned below and has clearly taken on the facies of the spring form (*bilunaria*, Esp.) (d) 9 specimens of a 2nd generation (spring form=*bilunaria*, Esp.) bred from ova obtained from a pairing between a ♂ and a ♀ of the 1st generation. The specimens shown under this heading emerged indoors from December 21st, 1930, to March 5th, 1931, and comprise 4 ♂♂ and 5 ♀♀, but 2 other specimens of this generation had emerged, as a 3rd brood, in the autumn of 1930 during his absence from home, and were lost. Two specimens of this 2nd generation, a ♂ and a ♀, have the central shade on the forewings bent inwards to join the inner line at the costa. In the ♀ the bend is very acute and the shade runs from the upper, costal, end of the lunar spot in a gentle curve to join the inner line at the costa where the two form a blotch of dark colour. In the ♂ the bend is less acute, but the blotch on the costa is larger and darker.

All the specimens, of both generations, are strongly marked and somewhat darker than normal.

He also showed a short series of *Phigalia pedaria*, Fb., from Wimbledon Common including normal, yellow and dark forms of the ♂ and normal and dark ♀♀.

Mr. Hy. J. Turner exhibited a specimen of *Eriocrania kaltenbachii* found in his sweeping net by Mr. Coulson during the Field Meeting on Saturday, April 19th, and communicated the following note.

"This species was discovered by the late Dr. J. H. Wood associated with the hazel (*Corylus avellana*) and much resembles *E. purpurella* which is associated with birch. On reaching home I could not identify it with the species of *Eriocranidae* (Micropterygidae) of which I had series. Noting the two or three species of which I was in want, I

soon found the probability of it being *E. kaltenbachii* as there was plenty of nut and no birch anywhere near. In the *E.M.M.* p. 5 (1890) Dr. Wood described the larva as "altogether different" from that of *purpurella*. On p. 31 of the same volume H. T. Stainton described the imago, having recognised it as a species bred by Kaltenbach in 1862 and then referred to *fastuosella*, a form of the oak-feeding *Mnemonic subpurpurella*, and named it after his friend. *M. subpurpurella* is a larger species although the oak-feeding form may be smaller than typical birch feeders. Dr. Wood's specimens were from the Hereford area. The following year C. G. Barrett identified specimens bred by Machin from mines in leaves of hornbeam in Ongar Park Wood. *E.M.M.* (1891) 21. Subsequently Eustace Bankes met with it in the Isle of Purbeck, associated with hazel, *l.c.* (1893) 47.

"The ground colour is a "pale shining bronzy golden" (Meyr.) or "greenish bronze" (Staint.), "more or less suffusedly strigulated reddish purple" (Meyr.) or "sparingly irrorated red" (Staint.). The markings are never so definite as in *purpurella*, *salopiella* or *sparmannella* in which species they form a pattern. Some examples are almost entirely suffused red except a tornal spot of ground colour which is always present. Occasionally the markings are very sparse. The wings are somewhat elongate and narrow and the antennae are half the length of the wings whereas in *subpurpurella* they are more than half. The cilia are greyish.

"The fact of its early appearance has probably been against its capture. The larvae when found were always met with in the unexpanded nut leaves."

Mr. Turner also exhibited a very beautiful cactus *Echinocactus leninghausii*, K.Sch., a rare species from Brazil. It is one of the smaller species of the genus, with very small papillae symmetrically arranged in regular rows, each papilla being surmounted by delicate yellow spines.

Mr. Robert Adkin exhibited two specimens of *Cosmotriche potatoria* ♀ ♀ in which the wings were much scalloped in several places. He said that soon after the pupal cocoons were formed they were placed in a cage that was infested by the tineid larvae *Endrosis lacteella* (*fenestrella*) and it was observed that the cocoons were attacked and perforated by the tineid larvae. He suggested the possibility of the wing cases of the pupae and the wings within them having been nibbled, while they were in a very soft stage, by the tineid larvae, thus causing the indentations, and that the

fringes, which were practically complete around them, had reformed during the later stages of growth within the pupa.

Mr. C. N. Hawkins said that he did not think that this could be so and mentioned that he had had cases where a similar condition of fully-fringed wing indentation had been caused by the pressure of some foreign body on the wing case of a newly-formed pupa. He thought it more likely that the tineid larvae, after entering the cocoon, had, in moving about inside it, pressed upon the pupa while still soft and thus caused the indentations in the wings, but that had they bitten the wings within the wing-cases there would have been clean cut holes without fringes around them. This latter view was supported by Dr. E. A. Cockayne.

Miss Winifred Brooke exhibited a large example of the marine Dahlia Anemone, *Tealia (Bunodes) crassicornis*, which after capture disgorged a large crab. This was also exhibited. It was taken at Dawlish. This species is exceedingly voracious.

Mr. F. J. Coulson exhibited the following Hemiptera:—From Bookham, April 4th: *Ranatra linearis*, *Naucoris cimicoides*, and *Plea minutissima*: taken at the Effingham Field Meeting on April 18th: *Anthocoris nemoralis*, *P. minutissima* and *Monanthia dunetorum* from hawthorn (by Mr. Eagles): and the Coleoptera *Rhantus notatus*, *R. exoletus* and *R. bistriatus* from the Esber Black Pond, March 23rd.

MAY 14th, 1931.

MR. C. N. HAWKINS, F.E.S., in the Chair.

Mr. A. W. Dennis exhibited the Mouse-tail, *Myosurus minimus*, a plant of the Order *Ranunculaceae*, from Earl's Colne, Essex, where it existed in quantity. Usually it is very uncommon and local.

Mr. T. R. Eagles exhibited the following larvae obtained from sallow catkins gathered at the Effingham Field Meeting on April 18th.—*Amathes circellaris*, *A. lota*, *Xanthia lutea (flavago)*, and *L. fulvago*, also very small larvae of *Diloba caeruleocephala* from sloe.

Mr. C. N. Hawkins exhibited larvae of *Toxocampa pastinum* from Box Hill.

Mr. F. J. Coulson exhibited the following captures at the Field Meeting at Effingham on April 18th, 1931.

COLEOPTERA—*Agabus guttatus*, *Otiorrhynchus singularis*, *Coccinella 10-punctata*, *Melanophthalma gibbosa*,* *Dorytomus taeniatus*,* *Chalcoides aurata*,* *Tachyporus chrysomelinus*, and *Rhynchites inter-*

punctatus; also one *Anthonomus* either *pedicularius* or *chevrolati*. Those marked * were common on sallows. He also showed series of *Ochthebius impressus*, Marsh (*pymaeus*, Payk.) from Bookham Pond taken on April 4th, 1931.

HEMIPTERA—*Corixa sahlbergi*.

MAY 16th, 1931.

FIELD MEETING—ST. MARTHA'S, CHILWORTH.

Leader—MR. HY. J. TURNER, F.E.S., F.R.H.S.

This turned out to be a thoroughly wet day, but the half a dozen members who went continued collecting until mid-afternoon. Among the lepidoptera taken on tree trunks were *Nola confusalis*, *Ectropis crepuscularia*, *E. punctulata*, *Lobophora halterata* (*hexapterata*), *Ornix avellanella*, and *Micropteryx mansuetella* (near the ponds). Of Lepidopterous larvae *Plusia pulchrina*, *P. iota*, *P. chrysitis*, *Strymon w-album*, *Calostigia didymata*, *Chesias legatella* (*spartiata*), *Asteroscopus sphinx* (*cassinea*) and *Hypena proboscidalis* were reported and old cocoons of *Dicranura bifida* (on poplar near the ponds). There was an abundance of Psychid cases on the same poplars probably *Narycia monilifera* (*melanella*).

Mr. Coulson reported the following species of Coleoptera and Hemiptera:—

COLEOPTERA.—*Strophosomus capitatus* (*obesus*), commonly, *S. melanogrammus*, *Sciaphilus asperatus*, *Polydrosus pterygomalis*, *Phyllobius argentatus*, *P. pyri*, *P. viridiaeris*, *P. oblongus*, all more or less commonly, *Ceuthorrhynchus pollinarius*, on nettles commonly, *Sitones tibialis*, *Phytonomus variabilis*, *Balanobius pyrrhoceras*, commonly, wych elm and oak, *Lochmaea crataegi*, *Derocrepis rufipes*, *Luperus flavipes*, *Phaedon tumidulus*, *Dolopius marginatus*, *Agrion sputator*, *Coccinella 10-punctata*, *Xylodrepa 4-punctata* (by Mr. Hawkins), *Cateretes bipustulatus*, at pondside, Chilworth, *Rhynchites cavifrons* (*pubescens*), *Chaetocnema aridella* (*hortensis*).

HEMIPTERA.—*Acanthosoma haemorrhoidale*, *Nabis lativentris*, *Liocoris tripustulatus*, *Camptobrochis lutescens*.

The woods were blue with the wild hyacinth among which were scattered plants of red campion, and here and there one could find the white variety of the bluebell, while in the hedges were masses of stitchwort and near the ponds several patches of young growth of *Impatiens fulva* and specimens of the alien winter-cress, *Barbarea vulgaris*.

MAY 28th, 1931.

Mr. C. N. HAWKINS in the Chair.

Dr. Cockayne exhibited the larvae of *Apamea ophiogramma* feeding on *Digraphis arundinacea*, a coarse grass of wet situations.

Mr. D. E. Kimmins exhibited imagines of *Borionymia rava*, Withycombe (*Hemerobiidae*), 2 ♂ ♂ 1 ♀ captured at Oxshott, May 23rd, 1931. It occurs on *Pinus sylvestris*, L., and appears to be very local. There are no records of its occurrence elsewhere and even at Oxshott it seems to be restricted to two or three particular trees within a radius of about 50 yards.

Mr. C. N. Hawkins exhibited living larvae of the following Lepidoptera: *Plastenis (Tethea) subtusa*, F., Oxted, bred ab ovo; *Plusia chrysitis*, L., Chilworth, St. Martha's, 16.v.31; *Plusia iota*, L., Chilworth, 16.v.31; *Epinephele jurtina*, L. (*janira*, L.) Chiddingfold; *Epinephele* (? *hyperantus*) Chiddingfold; *Chloroclystis (Eupithecia) rectangulata*, L., Chilworth: and *Cidaria pyraliata*, Schiff., Chilworth.

MAY 31st, 1931.

FIELD MEETING.—OCKHAM COMMON.

Leader—Mr. C. McK. JARVIS.

The party consisted of seven members. The route was from Effingham station to May's Green and thence by devious footpaths and woods to Ockham Common where the younger trees were profitably worked for larvae of the Lepidoptera. The coleopterists were unable to work the sphagnum on the banks of the ponds owing to the height of the water. The Lepidopterists reported the capture of *Euchloë cardamines*, *Pyrameis cardui*, *Heliaca arbuti*, *Bupalus piniaria*, *Lobophora halterata* and *Eupithecia indigata*. Mr. Wakely reported among the Micros *Scoparia ambigualis*, *Platyptilia gonodactyla*, *Batodes angustiorana*, *Incurvaria muscalella*, *Gelechia ericetella* and in buttercup flowers *Micropteryx calthella*. Ova of *E. cardamines* and of *Gonepteryx rhamni* were reported. The larvae met with were *Poecilocampa populi*, *Lithosia lurideola*, *Nola cuculatella*, *Diloba caeruleocephala*, *Panolis griseo-variegata* (*piniperda*), *Taenio-campa munda*, *Theria rupicaprararia*, *Erannis leucophearia*, *Ellopija fasciaria* (*prosapiaria*), *Cacoecia piceana* in pine shoots, and on elm

Cerostoma ritella. The coleopterists reported *Silpha quadripunctata*, *Hyllobius abietis*, *Pissodes pini*, *Hedobia imperialis*, *Calvia 14-guttata*, *Dromius angustus* and *Melolontha vulgaris*. The day was exceptionally fine for the season.

JUNE 11th, 1931.

Mr. C. N. HAWKINS, F.E.S., in the Chair.

Mr. T. R. Eagles exhibited the larvae of *Panolis griseo-variegata* (*piniperda*) from Ockham and of *Amphipyra tragopogonis* from Crawley, Sussex.

Dr. Bull reported the occurrence of *Polygonia c-album* on April 30th, and *Brenthis euphrosyne* on May 13th, in West Kent, *Pyrameis cardui* at Beckley on May 24th, and at Broxbourne, Herts, on May 25th.

Mr. de Worms exhibited full-fed larvae of *Eugonia polychloros* from France and larvae just emerged of *Pyrameis cardui*.

Mr. S. N. A. Jacobs exhibited the pupa of *Borkhausenia pseudospretella*, and larvae of *Coleophoralineolea*, Haw. (= *crocogrammos*, Zell.) on *Ballota nigra*.

Mr. Eagles also exhibited larvae of *Strymon w-album* and of *Chesias legatella* (*spartiata*) from St. Martha's Hill, Surrey, together with larvae of *Comibaena pustulata* (*bajularia*) from Crawley, Sussex.

Mr. S. Wakely exhibited a series of *Phycis betulae* bred last year from larvae taken in West Wickham woods, one of its old localities now nearly all cultivated or built over. He also showed larvae of the same species and of *Brephos parthenias* from the same area; and from Colley Hill, Reigate, a trap-door spider, *Atypus sulzeri*.

JUNE 13th, 1931.

FIELD MEETING—WESTERHAM.

Leader—Mr. S. N. A. JACOBS.

The party, though small, repaired to the High Chart where much larvae beating was done, and although the larvae of *Operophtera brumata*, *Erannis defoliaria*, and *Calymnia trapezina* were so abundant as almost to assume the nature of a pest, members were not unrewarded for the energy expended. The weather was ideal, being

warm and sunny, and this very beautiful part of the country was at its best. Tea was taken at Pitt's Cottage, after which members went their several ways, and if the captures were not entirely composed of rarities, at least a pleasant afternoon was passed not altogether devoid of interest.

Insects taken and noted included a fine fresh female *Stauropus fagi*, and *Eupithecia lariciata* was observed plentifully on tree trunks. Larvae of *Amphipyra pyramidea*, *Peronea ribeana*, *Grapholitha naevana* (producing eventually the *geminana* form associated with the bilberry), *Cemiostoma radiatella* and *C. costella*, also *Lita maculca* were taken, the last named being common in the seed vessels of *Stellaria*. Larvae of *Tortrix podana* were abundant, but almost universally heavily parasitised. Mr. S. Wakely reported also *Cnephasia (Isotrias) hybridana* and *Oecophora (Acompsia) panzerella*.

JUNE 21st, 1931.

FIELD MEETING—GROOMBRIDGE, KENT.

Leader—DR. G. V. BULL.

The weather was fine but only three members attended. Thirty-one species of Macrolepidoptera were observed and Mr. Wakely reported several Micros making in all 38 species. The following is a complete list.

Gonepteryx rhamni, *Brenthis euphrosyne*, *B. selene*, *Pyrameis atalanta*, *Epinephele jurtina*, *Coenonympha pamphilus*, *Polyommatus icarus*, *Adopaea sylvanus*, *A. flava (thamas)*, *Macrothylacia rubi*, *Diacrisia sanio*, *Drepana falcata*, *Cybosia mesomella*, *Anarta myrtilli*, *Rusina tenebrosa*, *Euclidia mi*, *Phytometra viridaria (aenea)*, *Cosymbia pendularia*, *Eulype hastata*, *Xanthorhoë montanata*, *Epirrhoë alternata (sociata)*, *Ellopiia fasciaria (prosapiaria)*, *Euchoeca nebulata (obliterata)*, *Euphyia bilineata*, *Venilia maculata*, *Semiothisa notata*, *S. liturata*, *Lithina chlorosata (petraria)*, *Perconia strigillaria*, *Hepialus lupulinus*, *Perinephele lancealis*, *Pempelia palumbella*, *Tortrix heparana*, *Evtria pinivorana* and *Pleurota bicostella*.

Larvae of *P. griseo-variegata* were plentiful but were subsequently found to be extensively parasitised. Larvae of *G. rhamni* and of *Pandemis (Tortrix) heparana* were also obtained.

JUNE 25th, 1931.

Mr. C. N. HAWKINS, F.E.S., in the Chair.

Mr. Hawkins exhibited full fed larvae of *Coremia (Ochyria) spadicearia*. Schiff. (*ferrugata*, Stdgr. nec Clerck), bred from ova laid by a ♀ taken at Bookham. The ova were laid 26-28.v.31. He also showed a short series of *Nothopteryx (Lobophora, Trichopteryx) polyommata*, Schiff., bred this year from larvae obtained at Leatherhead.

Mr. A. E. Tonge exhibited newly hatched larvae of *Dicranura vinnula*, and from Somerset larvae of *Xylina conspicillaris*.

Mr. Dennis exhibited a photograph of the specialised hairs of the "Orange-tip" butterfly, *Fuchsloë cardamines*. Magnification $\times 25$.

Mr. Main exhibited the larva of *Acanthoclisia* and called attention to the closing of the bottom of the box by cellophane, the covering used for sweets. Mr. Jacobs remarked that it should not be stretched too tightly as then this substance often splits with change of atmosphere.

Mr. Robert Adkin exhibited a specimen of *Cerura bijida* together with the cocoon from which it had emerged. The cocoon was placed near a knot on the stem of a young poplar tree, and agreed so closely in texture and colour with the bark of the tree, that until the hole by which the moth had emerged was made the cocoon was hardly discernible. They were taken from a tree growing in the town of Eastbourne on May 6th.

He also exhibited cases of what he believed to be those of the Tineid *Luffia lapidella*, Göze. He said that in searching the stems of elm trees that border many of the roads in Eastbourne, he had found that these cases were fairly common on many of them. The larvae were feeding on the powdery lichens with which the stems of many of the trees are almost covered, and, so far as he could judge, were at the present time full-fed. Noticing that similar lichens were growing on walls adjacent to the trees he had searched them also, and had found on them a few similar cases, but they were much less common on the walls than they were on the trees. He thought that cases would be found to be referable to the parthogenetic form of the species which Stainton named *pomonae*, and Stephens *ferchaultella*, and which is believed to produce only females.

Mr. Tonge said that he met with the cases of *L. lapidella* in abundance on an old wall at Shoreham in Sussex.

Mr. S. N. A. Jacobs exhibited larvae of *Coleophora saturatella*, Stainton, from Bromley, Kent, a local Tineid species, confined to the south-east of England. It is the practice of the larva to mine broom leaves, and the leaves of dyer's greenweed from the tip to about a quarter of an inch down the leaf, and as the enlargement of the case becomes necessary the skin of a mined portion is detached from the leaf and added to the case.

Mr. J. A. Downes exhibited a ♂ specimen of *Rhodometra (Sterrha) sacrarica* taken on Wimbledon common 23.vi.21. A rare and casual immigrant. The specimen was much worn.

Mr. Hy. J. Turner exhibited living larvae of *Dimorpha versicolora* from ova found at Aviemore, Scotland.

Mr. Macdonald exhibited a pair of the extremely brilliant Madagascar moth, *Chrysidia madagascariensis (Urania rhipheus)*.

Dr. G. V. Bull exhibited a *Brenthis selene* with the marginal markings of all the wings rayed, there being but few other markings in the central areas of the wings; it was taken in W. Kent. He reported *Macrothylacia rubi* ♀ on a sheet at light and on June 16th and 22nd, *Heliothis peltigera* in his garden at Sandhurst. He remarked that he had found ethyl acetate a useful agent for killing.

On Dr. Bull's behalf Mr. Tonge exhibited stereoscopic slides of the eggs of *Hqrisme (Phibalapteryx) tersata*.

Mr. S. Wakely exhibited a deformed ♂ and 2 ♀ ♀ of the Psychid, *Fumca intermediella* ? bred from cases taken in Broadwater Forest on the occasion of the recent field-meeting.

Mr. M. Niblett exhibited the terminal galls of *Aulax hieracii*, Sek. on stems of *Hieracium* sp. collected on Wimbledon Common on 12.iv.31 by Mr. C. N. Hawkins, and contributed the following note.

“ This gall occurs on roots and stems, but usually at the top of the latter, where a solid globular or cup-shaped swelling develops. Seldom more than one gall occurs on a plant. When mature it has a glabrous and dull brown surface. It occurs on *Hieracium silvaticum*, *H. sabaudum*, Toadflax and Couch.”

The Emergences were:—16.v.31 : 1 Chalcid, 5 *Aulax hieracii*. 26.v.31 : 15 Chalcids, 18 *Aulax hieracii*. 1.vi.31 : 20 Chalcids. 4.vi.31 : 12 Chalcids, 1 *Aulax hieracii*. 8.vi.31 : 15 Chalcids.

He also reported the occurrence of the galls of the beetle *Saperda populnea* from Effingham.

Mr. C. N. Hawkins, on behalf of Dr. Cockayne, exhibited larvae

and cocoons of *Zygaena exulans* from Braemar and discussed the life-history.

Mr. Grosvenor noted that the larva of this species never feeds up in one year, and takes two winters at least to mature. He now had larvae which had gone over three winters and might go a fourth. The species was a high alpine one and the climatic conditions prevailing made it a necessity to go over at least two winters. The hibernating larvae of the first winter were very small and grey. He compared it with *Z. anthyllidis* another high alpine species which necessarily had a similarly protracted larval life.

Subsequently reports of the occurrence of the following migratory species were given. *Colias croceus*, Earlswood, etc.; *Plyrus licornica*, Storrington, Guildford, the Midlands, etc.; *Rhometra sacraria*, Wimbledon Common; *Nomophila noctuella*, Sussex; *Pyrameis cardui*, many places; *Heliothis peltigera*, W. Kent, Enfield, etc.; *P. atalanta*, Abbot's Wood; *Macroglossum stellatarum*, several places; *Plusia gamma*, coastal areas; and *Plutella maculipennis (cruciferarum)*, the Crumbles, Eastbourne, common.

JULY 9th, 1931.

Mr. C. N. HAWKINS, F.E.S., in the Chair.

Dr. Cockayne exhibited an Oestrid Fly, subsequently identified as *Cephenomyia auribarbis*, taken by himself in Aberdeenshire at Braemar, 2,700 ft., and supposed to be attached to the red-deer.

Mr. Hawkins exhibited a fasciated stem from a privet bush in his garden; the smaller twigs and the leaves were much bunched together. It was considered to be a very rare occurrence in the privet. Mr. Step was not aware of a previous instance. He also exhibited the larvae of *Euphyia silaceata* from Westcot, Dorking, feeding on *Epilobium* sp., and pointed out the unusual pink form.

Mr. Robert Adkin exhibited a series of *Tortrix pronubana*. He said that on June 8th last he received a message from a friend living in Eastbourne that a "plumbago" in his conservatory was being rapidly killed by caterpillars that had not only devoured most of the leaves but were gnawing the twigs and thus killing the plant; from a sample of the caterpillars sent with the message the specimens exhibited were bred. Although *pronubana*, as is well known, will eat almost any green herb and thrive upon it, it is seldom that in

the open it does any great damage, but when it gains a footing in any sort of glass-house, it almost invariably becomes a serious pest.

He also exhibited a specimen of *Batodes angustiorana* and made the following remarks. For many years past he had occasionally found lepidopterous larvae feeding on the skins of stored apples, living in a web between the paper wrapping and the fruit, but as the larvae generally had been either killed or damaged in removing the wrappers, it was not until the present year that he had succeeded in rearing a moth. In February a larva was so found and fortunately undamaged; it was put away with the apple and paper, just as it was found, and on June 28th the moth exhibited emerged. Presumably the eggs are laid on the apples while on the tree and hatch out at some time during the late autumn or winter.

Mr. Eagles exhibited the cocoon of *Sarothripus verayana* from Hoddesdon, Herts; a larva of *Cerura bifida* from Enfield, and larva and ovum of *C. furcula* from Crawley, Sussex.

Mr. J. A. Downes exhibited male, female and ova of *Hipparchus (Geometra) papilionaria* taken at Wimbledon on July 7th,; and a *Papilio machaon* bred from one of 6 ova found wild at Wicken on June 8th to 10th, 1930. Three of the 6 larvae died in the 1st instar, the others duly pupated and emerged 10.viii.30, 26.vi.31 and 9.vii.31.

Reports were made that *Strymon pruni* had regained its strength in its Midland locality, and that *Plusia ni* had occurred in Ireland.

Mr. B. J. Dudbridge exhibited an aberrant specimen of *Mimas (Dilina) tiliae* in which the broad band crossing the central area of the forewing was entire, but brown instead of olive green. On each side of it the ground colour of the forewing inclined to a brownish buff; in the outer area it was a brownish green. The dusky band on the hindwing had enlarged to cover the whole wing except the margin. The specimen was taken at rest on a lime tree at Wimbledon, 28.v.31.

Mr. F. J. Coulson exhibited the Coleoptera *Dytiscus circumflexus*, ♂ and ♀ and underside, which was common on Harty Marsh, Sheppey, on June 3rd, 1931, and *Dytiscus marginalis*, which was common at Horsell on June 6th, 1931, particularly to show the underside distinguishing characters. The former species had a yellow scutellum and a sharp pointed prolonged process beneath the posterior coxae, whereas the latter species had a black scutellum, and a short, blunt process beneath the posterior coxae.

Mr. Coulson also exhibited the following Hemiptera on which he contributed notes.

Miris laevigatus, which was very abundant amongst long grass at Darenth on June 4th, 1931, but not observed in Surrey, and *Miris calcaratus*, taken commonly at Horsell, on June 6th, 1931. The former species was distinguished by femora without teeth while the latter had femora with 2 teeth each.

Nepa cinerea occurred at Woking on May 23rd, 1931, at Harty Marsh, Sheppey, on June 3rd, 1931, and at Brookwood on June 8th, 1931 (underside shown).

Hydrometra stagnorum occurred at all the above places with *Nepa cinerea*.

Eusarcoris aeneus, one specimen from Brookwood, June 8th, 1931. This species is recorded as rare in the New Forest and at Faversham.

Of Coleoptera Mr. Coulson exhibited three species of *Anthrenus* from one plant of *Spiraea* in his garden at Merton Park, 28.vi.1931. *A. verbasci* (*varius*) commonly, usually not common; *A. muscorum*, 2 specimens, usually locally common; *A. fuscus* (*claviger*), one specimen, local, but fairly common.

Mr. Coulson also exhibited the species of Coleoptera and Hemiptera taken by him on May 16th, 1931, at the Field Meeting at St. Martha's, Chilworth, and already listed in the Report of the Field Meeting on page 56.

Mr. Coulson then exhibited the following species of Coleoptera and Hemiptera, illustrative of the outstanding species on May 23rd and early June, 1931.

COLEOPTERA.—*Hydroporus dorsalis*, with typical markings and with obsolete elytral markings. Darenth Wood pond, June 4th. *Cionus hortulanus* and *C. pulchellus*, from *Scrophularia*, Darenth Wood, June 4th. *Alosterna tabacicolor*, commonly on *Umbelliferae* in lane to Darenth Wood, 4.vi. *Berosus affinis*, occurred commonly on Harty Marsh, Sheppey, June 3rd. *Bruchidius cisti* (*villosus*) from broom at Brookwood, June 8th. *Elaphrus reparius*, occurring frequently on mud flats by the stream, Horsell, June 6th. *Hyphydrus oratus* and *Hydroporus palustris*, both common on May 23rd, at Woking, by the Canal. *Phytonomus adspersus*, with 1 var. *alternans*, from Bookham, June 5th. *Prasocuris phellandrii*, as usual, common, at Bookham Pond, June 5th. *Philhydrus coarctatus*, frequent at Bookham, June 5th. *Helochares griseus*, common in pond on Horsell Common, June 6th.

Hawthorn bloom was productive and amongst rarer species, the following occurred commonly. *Clytus arietis*, at Darenth, 4.vi., and Horsell, 6.vi. *Tetrops praeusta*, at Bookham, 5.vi. Horsell,

6.vi., and Brookwood 8.vi. *Grammoptera ruficornis*, Bookham, 5.vi., and Horsell, 6.vi. *Rhynchites aequatus*, with var. *paykulli* at Bookham, June 5th.

Dr. Cockayne gave notes on the Lepidoptera met with during his holiday in Aberdeenshire in June. This year he went earlier than usual and the snow was still in evidence on the hills and mountains west of his locale. One of his objects was to get larvae of *Zygaena exulans* at Braemar. He stated that the ground was very extensive and consisted of patches of short heather and low-growing grass interspersed with bearberry at scattered intervals, and a little crowberry. He found newly spun cocoons on low growing crowberry and on dead heather, but never on living heather. The larvae appeared to eat out the terminal buds and the berries of crowberry. Only one larva did he find after long search on each of wortleberry, bilberry and heath. The cocoons were all spun on the underside of stems of crowberry, one or two in or on the ground and some on lichen. They were of very thin substance and loosely attached. The imagines were often defective on emergence, which takes place towards the end of June and in early July. The larvae he found were of varying size from very tiny ones to those which had apparently nearly reached maturity. The tiny larvae had probably gone over one winter, the next size were a little larger and blacker and were possibly those that had gone two winters. Other were still larger and blacker.

Gnophos myrtillata (obfuscaria).—Of the larvae he found only two. It was no use shaking the heather and it needed a warm night. In captivity they lie along the stem on the bottom of the cage.

Anarta melanopa.—Was only to be found high up the mountain slopes.

A. cordigera.—Never as high up as *A. melanopa*. The larva feeds on bearberry.

Isturgia (Fidonia) carbonaria.—Is also attached to bearberry. The ♂ flies for about an hour and a half on warm nights but the ♀ must be stirred up.

Calostigia salicata.—Attracted to bearberry flowers.

Hadena (Mamestra) glauca.—Also comes to bearberry flowers.

Eupithecia sobrinata and *Thera cognata (simulata)*.—Both occurred abundantly as larvae on the juniper, but were much parasitized.

Lygria populata.—The larvae fed up very rapidly and both the usual and the black form were bred.

Psodos coracina (trepidata).—Only two or three were found.

Sugaring was far from productive owing no doubt to mist and cold evenings. Birch, bilberry and grass were sugared and the first night gave promise of better things with two dozen *Hadena rectilinea*, a dozen *Hadena adusta*, *Palimpsestis duplaris*, *Xylophasia rurea*, *Agrotis ypsilon*, etc. But this abundance did not last for the second night when four *H. rectilinea* and nothing else came.

Plusia pulchrina.—Larvae were got by beating nettles.

P. interrogationis.—The larvae on heather, widely scattered, 2 or 3 per day.

Dasychira fascelina.—Cocoons were pretty common everywhere on the lower ground. The young larvae were abundant but mostly parasitised.

Entephria caesiata.—The larvae common on heather.

Bupalus piniaria.—Common. The females had only a thin streak of white on hind wings, but he obtained them also with uniformly white hind wings.

Noctua castanea f. *neglecta*.—Common.

Hydriomena furcata (*sordidata*).—Larvae abundant on bilberry.

Xanthorhoë fluctuata.—Were all very dark.

X. montanata.—Were small and light in colour.

JULY 11th, 1931.

FIELD MEETING—CHALFONT ROAD.

Leader—MR. S. N. A. JACOBS.

The weather, for such a wet year, was again all that could be desired, and a small party worked the beech woods to the North of Chalfont Station thoroughly for the local *Discoloria blomeri*, of which a round dozen specimens were obtained, and eggs were deposited by one of the females which was sleeved out by its captor.

Abraaxas sylvata was found but not in the usual numbers. Seed capsules of *Silene inflata* gathered for larvae of macro-lepidoptera produced cases with larvae of *Coleophora nutantella*, and *Laspeyresia aurana* was taken in fresh condition flying in the sunshine about the hawthorn trees bordering the road to the woods. Larvae of *Pyrameis cardui* were taken on thistles growing at the road side. After a pleasant ramble, tea was taken at the White Lion tea garden, whence the party dispersed, some members returning to search for further *P. cardui* larvae, others returning home, but it is to be thought that all were well pleased with the day's work.

JULY 23rd, 1931.

The PRESIDENT in the CHAIR.

Dr. Cockayne exhibited the Oestrid (Dip.) species which he had obtained on the mountains at a height of some 2,500 ft. up. The species *Cephenomyia auribarbis* was attached to the red deer which it attacks persistently, laying its ova in the nostrils, etc., of the deer. (See "E.M.M." 1898, 1900, and 1903.) It is confined to Scotland.

He also showed the larvae of *Boarmia cinctaria* from ova laid by a Surrey ♀, and larvae of *Melanippe tristata*.

Mr. Robert Adkin exhibited living specimens of the Tineid moth *Blastobasis lignea*, Walsm., in order to show their resting attitude. They were taken in his garden at Eastbourne on the morning of July 23rd, and in their semi-concealed position looked much like the common "silver-fish."

Mr. H. Moore exhibited Coral-rock and Radiolarian earth from Barbados, and contributed the following note.

"Although my exhibit is somewhat unusual, I thought there was just the possibility it might interest some others beside myself. It is a fragment of the gigantic coral that forms the bulk of the coral-rock that caps the Island of Barbados, for which I am indebted to a friend who wintered there, and had a dozen barrels full of it sent home to decorate the sides of his ornamental pond in mid-Essex. Back in the long ago, what is now Barbados was at the bottom of the deep sea. Then some great convulsion broke up the ocean bed, and a period of upheaval was started. When within some 300 feet of the surface, the coral polype began its work, covering the whole of the submerged island with a veneer of coral, up to 100 feet in thickness, which was subsequently upheaved to over 1,100 feet above the sea. To quote an American geologist 'this calcareous coral-rock is made up of gigantic coral heads, consisting of reefs like those now growing around the island. The highways are cut through these reefs, the stone houses are constructed of them, the planter plows into their surface to grow his cane.'

"The underlying beds are the clays and gravels of the Eocene period, like those under London. Where the coral-rock by denudation has disappeared, a deep-sea deposit has been exposed, the well known radiolarian earth, much in demand by readers of 'Science Gossip,' some 40 or more years ago. Apart from its interest to microscopists, it was thought to have some commercial value as a polishing powder. Upon enquiring whether any is exported, my

namesake writes, 'There is a local demand for various purposes, and probably some of it finds its way to America, but so far as the U.K. market is concerned, there is no hope. In spite of the shipping depression, the lines which have a monopoly of freight from B.W.I. would rather carry water-ballast, than carry anything at less than 45/- per ton. Any of our microscopists who would like a sample of this earth, may help themselves.'

Mr. C. N. Hawkins exhibited the larvae of *Hemaris fuciformis* including a red-spotted example as well as the ordinary green-coloured form.

Mr. Grosvenor exhibited a yellow form of *Zygaena filipendulae* bred from a pairing of the red offspring of a yellow and red pairing the year before last. He noted that both *Z. trifolii* and *Z. filipendulae* always piled their ova while *Z. loniceræ* did not do so.

Mr. Barnett exhibited *Perizoma flavofasciata (decolorata)* from Beddington of unusually large size, and a very dark marked *Dasychira pudibunda* from E. Croydon.

Mr. de Worms exhibited larvae of *Panolis griseo-variegata (piniperda)*, a short bred series of *Cepphis advenaria* from ova, a pupa of *Boletobia fuliginaria* and ova of *Ellopia fasciaria (prosapiaria)*.

Mr. Wakely exhibited an example of the Wood Cricket (*Gryllus sylvestris*) from Parkhurst Forest, I. of Wight. He also showed a cocoon of the Noctuid *Acosmetia caliginosa*.

Mr. Eagles exhibited ova of *Discoloxia blomeri* laid by a moth taken at the Chalfont and Latimer Field Meeting on July 11th.

Mr. Ferier exhibited a series of the Dipteron *Volucella pellucens* from Hurt Wood, Surrey, on *Rhamnus frangula*, and communicated the following note.

"VOLUCELLA PELLUCENS, L. A SECONDARY SEXUAL CHARACTER.— Though this Syrphid fly is fairly common, a fact that appears to have escaped notice is here recorded, that is the relation of the wings in the resting position to the dark median stripe on the second abdominal segment. This stripe, strongly contrasted with the semi-transparent background of the segment, is distinct in the male only. It is reduced to a vestigial dot in the female. The fly was seen in abundance (24.vi.31 on alder buckthorn) and it was observed that in the resting position the angle of the wings varied with the sex. In the male this angle was slightly larger, which meant that where the anal portion of the wings approximated there was a gap. This gap corresponded exactly with the stripe on the

abdominal segment. In the female the wings met at the anal area and the stripe was absent. After pinning the wings are liable to distortion owing to contraction of the thoracic muscles which explains why this observation has apparently not been previously recorded."

Mr. Syms exhibited a larva of *Microdon* sp. (Dip.) taken with ants at Byfleet.

Mr. Whitting exhibited a very pale variety of *Coenonympha pamphilus* taken in W. Kent on June 21st.

Mr. H. W. Andrews exhibited a short series of *Dioctria linearis*, F., a somewhat scarce species of Diptera.

Mr. Turner exhibited a short series of hybrid *Saturnia pavonia* ♂ × *S. pyri* ♀ from ova laid by parents taken on the lower Rhine.

Several members gave notes of their experiences this year. Mr. Blair had found full fed larvae of *Heliothis peltigera* on Henbane and *Ononis* at Braunton Burrows. *Pyrameis cardui* and *Plusia gamma* were abundant at the same place and *Phryxus livornica* had been taken; he also said that *Issoria lathonia* had been reported from N. Devon. Mr. Newman had seen several specimens of *Colias croceus* in Bexley, N. Kent, on June 5th to 7th, and a worn female was captured at Snodland on July 11th.

JULY 25th, 1931.

FIELD MEETING.—BOX HILL.

Leader—MR. HY. J TURNER, F.E.S., F.R.H.S.

Two members besides the leader attended this meeting at the start but at various times in the afternoon some nine others recorded an attendance. The weather was well up to 1931 sample and most of those present must have taken away a good sufficiency of moisture.

Mr. Eagles reported that *Ectropis* (*Tephrosia*) *bistortata* (*biundularia*) taken on a fence was a ♂. A quantity of larvae of *Dianthoecia* species were obtained from a cornfield in hope of *D. conspersa*. He beat a larva of *Sphinx ligustri* from privet and 3 from *Viburnum lantana*, and from young ash trees *Craniophora* (*Acrionicta*) *ligustri* and *Gonodontis bidentata*. A female *Lithosia complana* he beat out laid a large batch of ova which hatched in due course but the larvae were subsequently lost owing to his absence from home.

The orchid *Cephalanthera longifolia* (*ensifolia*) and a pale-flowered form of *Hypericum perforatum* were noted. A handsome white campion Mr. Eagles found turned out to be a hybrid (*Lychnis alba* × *L. dioica*). Dr. Robertson reported a *Toxocampa pastinum* and Mr. Niblett obtained a number of galls, particularly some on groundsel.

Mr. K. G. Blair reported larvae of *Cassida fastuosa* on *Inula conyza* and of *Cionus thapsi* on *Verbascum nigrum*; also *Cryptocephalus pusillus* in numbers and *C. bilineatus* more rarely by sweeping.

AUGUST 13th, 1931.

The PRESIDENT in the Chair.

Mr. C. N. Hawkins exhibited an example of the uncommon Neuropteran, *Nothochrysa capitata*, from Friday St., Surrey.

Mr. Grosvenor exhibited larvae of the *Zygaena* species and forms he was feeding at the time, including some from ova that Mr. Main had obtained for him in the S. of France at Agay. Some were now full fed while others evidently intended to hibernate. Also examples of the larvae of continental *Zygaena achilleae* and of the so-called *Z. achilleae* from Scotland. He also showed larvae of *Z. levandulae* and of *Z. rhadamanthus*, which he had not hitherto had.

Mr. Priske exhibited galls on the mugwort, *Artemisia vulgaris*, which were subsequently identified as made by an Aphid, *Cryptosiphum artemisiae*. He also showed a remarkable foliar spike of *Plantago major*. Mr. Dennis remarked that such was figured in the famous Herbal of Gerarde.

Mr. Stanley N. A. Jacobs exhibited an example of the New Zealand *Tortrix postrittana*, Wet., and communicated the following note.—“This species is resident in both Australia and New Zealand, feeding on apple foliage, and often assuming the nature of a pest, defoliating the trees after the manner of our *T. viridana*. The individual specimen was bred from a larva found on the surface of an imported New Zealand apple; it was nearly full fed when received, and had, presumably for want of leaves, gnawed the skin of the apple to some small extent. The larva is olive green with obscure rusty markings on the back, there being four longitudinal lines and transverse lines at the junction of the segments. The head and anal plates were light brown. The larva pupated on May 16th, and the imago appeared on June 8th, 1931.”

Mr. Robert Adkin exhibited: (a) A series of *Laspeyresia* (*Carpocapsa*) *pomonella*, L., reared between June 28th and July 19th, 1931, from larvae feeding in apples collected in his garden at Eastbourne during the autumn of 1930; (b) A wild bred specimen captured on July 20th, 1931; and (c) A specimen of the same species bred on July 9th, 1931, from a larva found on October 5th, 1930, feeding in the flesh of a melon grown in a frame in his garden. He also exhibited apparatus that he had found useful in rearing this species and read the following note.—

“In our “Proceedings” for 1928 at page 24 I gave some notes on the life-history of *pomonella* and in a footnote briefly described a method that I had found successful for rearing the species. Since that time I have been trying various other methods and the one that appears to me to be the most convenient and entirely successful is as follows. I procure one of the largest glass pans in which cooked tongues are sold that I can lay my hands upon. Then I make up what may be described as a bark “sandwich,” that will just stand up loosely within the pan. This “sandwich” is made up of two pieces of thin wood with jagged ends (pieces of an old park paling suit admirably), between them pieces of rough bark, stripped from old garden stakes or anything of that sort, with a little dry moss are placed, a little more moss is added on the outside to give a springiness and the whole bound together with bast. The apples containing the larvae are placed in the pan on either side of the “sandwich” and the whole covered with a piece of tiffany or muslin which is secured by a rubber band.

“After a week or so the apples may be examined, those from which the larvae have escaped removed and others added, in this way two or three lots may be passed through the pan in the course of a season, but they should all be removed before winter sets in, or they may become rotten; and the rubber band should be replaced by a piece of string. The pan may then be left in some open shed, where it will be fully exposed to air, throughout the winter. In spring, say early in June, if the tiffany is replaced by a piece of glass it is easy to see the moths as they emerge.

“Although I have tried this method only for *pomonella*, it would probably be found to be useful for most fruit-feeding larvae; but for soft fruits, such as plums, etc., it would probably be desirable to put a little dry sand or earth in the bottom of the pan to absorb any moisture that might run from the fruit.”

Mr. Edwards exhibited examples of Dandelion leaves which were variegated, showing numerous white areas.

Mr. Dennis exhibited a larva of *Smerinthus ocellatus* in which the ground colour was unusually pale, with a subdorsal row of purple spots, and other purple spots on each side of the spiracles.

Dr. Cockayne exhibited the ova of *Laelia coenosa* and three larvae of *Isturgia carbonaria* from Braemar. They were fed from the egg on bearberry, *Arctostaphylos uva-ursi*. The ground colour had been described as brown but these were green with deep red anal flap and base of anal claspers. He also showed a Tipulid from Braemar, subsequently presented to the Society's collection and identified as *Xyphura atrata*, L., and a bred series of *Entephria caesiata* from Braemar.

Mr. Eagles exhibited the larva of *Craniophora ligustri* beaten from ash at Box Hill at the recent Field Meeting.

Mr. S. Wakely exhibited larvae of *Earias chlorana* taken near Croydon, showing green transverse lines, and imagines of *Ellopiia prosapiaria*, bred from pupae beaten off Scotch Fir, Broadwater Forest, Groombridge Field Meeting, June 21st; *Tortrix pronubana*, bred from larvae feeding on laurel, afterwards fed on sycamore, Welsh Harp, Hendon; and *T. piceana*, bred from larvae beaten from Scotch Fir, May 31st, Ockham Field Meeting, "local and uncommon." —Meyrick.

AUGUST 27th, 1931.

The PRESIDENT in the Chair.

Dr. Cockayne exhibited a series of *Noctua castanea* (*neglecta*) bred from larvae found at Braemar in June, 1931. The series included grey, pink, red, and brownish-red forms.

Mr. de Worms exhibited a series of *Aphantopus hyperantus* with lanceolate eyespots, from the New Forest, larvae of *Pygaera bucephala* from Regent's Park, and reported that he had met with *Strymon* (*Zephyrus*) *quercus* at light 11.30 p.m. on August 4th.

Mr. Blair exhibited a gall collected by Mr. Eagles at Hoddesdon of the Dipteron *Agromyza schineri* on Aspen together with a Braconid parasite, *Dacnusa* sp. (probably *lateralis*, Hal.) that had emerged from it. The gall bears a striking resemblance to the cocoon of a Nolid moth, one of which was exhibited with the gall for comparison. He also showed some inflated flower buds of *Epilobium angustifolium* from Oxshott galled by the Cecidomyid fly *Perrisia epilobii*, Löw.

Mr. Robert Adkin exhibited series of the Tineids *Cerostoma vittella*, L., together with its dark form *carbonella*, Hb., and of *Telphusa fugitivella*, Zell., all of which were captured on the stems of trees growing in his garden at Eastbourne. He said that both species were elm feeders, and he had no doubt that their larvae fed on the elms that grow all along the roads that surround the garden, yet, although *C. vittella* occurred sparingly and *T. fugitivella* commonly at rest on the stems of sycamores and evergreen oaks in the garden, frequent and careful search of the elms growing just outside had failed to produce the former species and very rarely an occasional single individual of the latter, in contrast with some ten or a dozen on an evergreen oak growing just inside the wall.

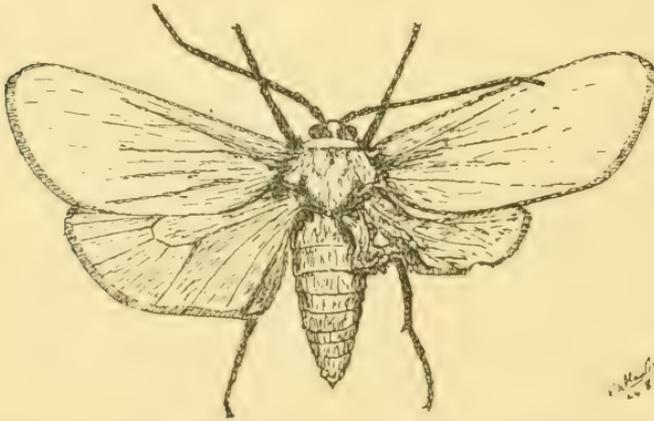
Mr. Hawkins exhibited a 6-winged ♀ of *Procris* (*Ino*, *Rhagades Adscita*) *cognata*, H.-S., and read the following note:—

“I bred this specimen on June 27th, last from a larva collected at Lewes, Sussex, on May 2nd. The accompanying sketch, though somewhat diagrammatic, shows the general appearance and the arrangement of the wings fairly well under a magnification of 4 diameters. As will be seen the wings on the left side are normal as is also the forewing on the right but the right hind-wing is small, somewhat contorted and the venation, which is very difficult to make out, owing to creases in the wing surface appears to be abnormal. This wing bears a well developed frenulum but seems to be placed on a slightly higher plane than normal. Just behind and partly beneath the latter wing is another wing, much curled and aborted and with the scaling very ill-developed and beneath this one again and completely hidden by it, is yet another very small wing which, so far as I could see before the insect was set, is little more than a pointed, scaleless flap, about $\frac{1}{16}$ th inch (or less) long. The larger of the two extra wings appears to me to be another right hind wing, that is, having the costa forward as in a normal hind wing, but I am by no means sure of this and I can see no frenulum. If I am right, it would appear at first sight that this is an exception from Bateson's Law*, but presumably the small hidden extra wing is really the first extra wing and a mirror image of the normal wing, *i.e.*, with the costa towards the rear, while the larger, visible one, is really the 2nd extra wing and a mirror image of the first, thus bringing the costa into the normal position for a right hind wing. Such a condition might possibly, I think, have

* That extra appendages are paired and in secondary symmetry with one another.—Eds.

been brought about by contortion and partial suppression caused by the pressure of neighbouring tissues and organs in the course of development. This has been suggested by Dr. E. A. Cockayne in his paper "Extra Wings in Lepidoptera" which appeared in the Trans. Ent. Soc. London for 1927, as an explanation of certain cases.

"It is unfortunate that I was unable to set the extra wings in a more favourable position for examination but all efforts to that end proved useless. However I am handing the specimen over to Dr. Cockayne and I have little doubt that, in spite of the difficulties he will be able to work out the details much more fully than I have done."



Procris (Ino, Rhagades, Adscita) cognata, H-S.
6-winged ♀ bred from Lewes larva on 27.6.31.
 X 4

SEPTEMBER 6th, 1931.

FIELD MEETING—WESTERHAM.

Leader—Mr. S. N. A. JACOBS.

A fair party gathered on the Green at Westerham and set off by the footpath towards Hosey Hill and Hosey Common. Beating was commenced on arrival at Hosey Hill and the party worked towards French Street, but bore South and then West, completing the circle via Hosey Common and Squerries Park, back to Westerham.

Lunch was taken in the sunshine on Hosey Common, while tea was taken at Pitt's Cottage. On this occasion, it is to be noted that good opportunity was offered for the study of the habits of the biting midges during tea. Once more the weather was element, and after a strenuous and enjoyable day's beating, if nothing of extreme rarity was taken or observed, it is none the less true that no one returned empty handed. The usual pine-feeding larvae were taken in large numbers, while amongst the products of the birch, were larvae of *Acrionicta leporina*. *Euphyia silaceata* was taken and also larvae of *Notodonta dromedarius*, *Pheosia dictaeoides*, and *Lobophora halterata*. The imago of *Strymon quercus* was noted in worn condition. Coleoptera in various stages and great variety were taken or noted, although nothing outstanding was reported.

SEPTEMBER 10th, 1931.

Dr. E. A. COCKAYNE, A.M., F.E.S., in the Chair.

Mr. Wakely submitted reports of his captures at the Field Meetings held at Ockham, May 31st, at Westerham on June 13th, and at Broadwater, June 21st, and exhibited many specimens. He also showed the larval cases of *Coleophora limoniella* with their living occupants feeding on sea lavender from the Essex marshes.

Mr. Bliss exhibited an Arctiid larva found among bananas from Columbia, *Perinephele lancealis* from the New Forest, and *Aphanotopus hyperantus* ab. *caeca* from Ranmore.

Mr. Thompson exhibited a very finely spotted example of the larva of *Amorpha populi* and a *Euvanessa antiopa* taken by himself in the eastern counties with much emphasised blue spotting and cream marginal bands. The last was possibly one of those which had been set free this season.

Dr. E. A. Cockayne exhibited small ♀ examples of *Ematurga atomaria* of a very light coloration, and examples of *Anarta cordigera*, *A. melanopa*, *Scodionia fagaria* (*belgiaria*), *Xanthorhoe montanata*, etc., all from Braemar. He discussed the comparison of the larva of *Hydrilla palustris* with that of *Caradrina morpheus*; the former was full-fed in the autumn but did not pupate until the spring. There was no resemblance whatever to the larva of *Petilampa arcuosa*, nor to that of *Acosmetia caliginosa*.

Mr. Dudbridge exhibited a female of *Cosmotriche potatoaria* which was of the same colour as the normal male. The larva was found

hibernating under a stone at Stroud, Glos., in early April and the moth emerged August 5th. He also exhibited *Hydriomena furcata* ab. *infuscata*, a very dark example bred from a larva taken at Ranmore Common on May 23rd and bred on June 28th.

Dr. Bull exhibited an *Epirrhoe rivata* with band of forewings only half the usual width, and *Pachygastris trifolii* from Dungeness, where at light 3 ♀s occurred to 1 ♂ in numbers.

Mr. Robert Adkin exhibited a series of the Tineid moth *Meessia argentimaculella*, Stt., and read the following note:—

“In December last (“Proc.” 1930, p. 77) I exhibited two specimens of this species that I had taken on the stem of an old cypress tree in my garden at Eastbourne in the previous July. This year a watch was kept on the tree from the middle of July onwards and the first moths were found on 24th, one or more being taken almost daily until August 5th, some sixteen specimens in all being secured. Emergence appears to take place during the morning, between 10 and 12 (S.T.), I have never found a moth before the former time nor after 1 o'clock, but round about 11 o'clock I have frequently found them with wings still limp. Possibly as soon as they are fully mature they take wing, or, more probably, run up the stem of the tree and hide away in the chinks of the bark. Little appears to be known of the earlier stages of the species beyond what Meyrick tells us, namely that the larva feeds from April to June, “in galleries amongst lichens on rocks,” and of course we may now add trees. On examining the lichen on which the moths were taken, I found several very small tubular structures on its surface, suggestive of old larval galleries, but more than that I cannot say at present. The lichen is the close growing, powdery looking form that is very common on old tree trunks and walls, and which Mr. Paulson tells me is without a perfect thallus and remains in that state as a lichen imperfecti, and that it is often known by the name of *Lepraria*.”

Mr. Eagles exhibited the larvae of *Eupithecia subnotata* which had occurred in some numbers on *Chenopodium* at Enfield.

Mr. Hy. J. Turner exhibited short series of *Zygaena trifolii* and of *Z. filipendulae* taken on the same ground at the same time near Effingham Junction, on July 24th, the former species being several weeks behind the normal time of appearance.

Dr. Bull communicated a report on the Field Meeting at Broadwater on June 21st.

Mr. Jarvis communicated a report on the Field Meeting at Ockham Common, May 31st.

Mr. Eagles subsequently communicated a report on the Field Meeting at Box Hill on July 25th.

SEPTEMBER 19th, 1931.

FIELD MEETING—CLANDON DOWNS.

Owing to the absence of a leader there was no formal meeting. Mr. Downes reported taking plenty of larvae of *Plusia chrysitis* on nettles and a small larva of *Eutricha quercifolia*. From spruce he obtained both larvae and pupae of *Thera variata* and in addition obtained a fair number of Noctuid and Geometrid larvae including several Eupitheciid species on ragwort and clematis. At the ragwort flowers he noted a worn example of *Strymon c-album*. In the train returning, near Cobham, a Kingfisher was noted when crossing the river Mole. [Kingfishers frequent this part of the Mole in some numbers.—HY.J.T.]

SEPTEMBER 24th, 1931.

The PRESIDENT in the Chair.

Mr. G. H. T. Stovin, M.R.C.S., L.R.C.P., of Westcliff-on-Sea was elected a member.

Dr. Cockayne exhibited the larvae of *Eupithecia extensaria*, and bred series of *Lygris pyraliata* and *L. populata* both from Braemar. The latter series contained some fine melanic examples with intermediates, together with a very beautiful variegated form.

Mr. Bliss exhibited living larvae of *Ectropis bistortata*.

Mr. Dennis exhibited a spotted form of the larva of *Smerinthus ocellata* from the Chelsea physic garden and a female of the Psychid *Luffia lapidella*, f. *ferchaultella*, Steph.

Dr. Bull exhibited a short series of *Polyommatus icarus* showing minor aberration from W. Kent and E. Sussex, and a larva of *Heliothis peltigera* from Dungeness.

Mr. Wakely exhibited the larvae of *Ephestia elutella* from ova laid by a female taken in the Society's rooms in Hibernia Chambers, also series of *Eupithecia sobrinata* and of *Hypsilophus marginellus*,

both species bred from larvae taken on the junipers on Purley Downs.

Mr. de Worms exhibited the ova of *Nonagria lutosa* on the reed stems on which they had just been laid.

Lantern slides were then exhibited by Messrs. Bunnett, Dennis and R. Adkin, also coloured slides of botanical subjects, by Mr. E. J. Bedford.

On behalf of Mr. E. Ernest Green, Mr. R. Adkin exhibited a slide of a hawthorn bush covered by the web of the Tineid moth *Scythropia crataegella*, L., a species of the family *Hyponomeutidae*; also of the perfect insect, and read the following note supplied by Mr. Green.

NOTE ON A REMARKABLE WEB-ENVELOPED BUSH. (Plate XI.)

Crataegus and other bushes may often be found with one or more branches enclosed in the web of small caterpillars; but I have never before observed such a complete envelopment as that shown in the accompanying photograph, which was taken at Camberley (by my son) on the June 12th of the present year (1931).

This remarkable object was rendered more conspicuous by the fact that the bush (*Crataegus oxyacantha*) was isolated in the middle of a grass field. When I first saw it, from a distance of about a hundred yards, it gave the appearance of a cloud, settled lightly on the grass. A closer examination revealed the extraordinary delicacy of the structure. The gauzy web followed the contour of the whole bush, extending to the extremities of every twig, from the base to the top-most branch. Nor was its beauty marred by any noticeable accumulations of excreta or other rubbish. The minute caterpillars were scattered throughout the intricate texture of the web. When first observed, the foliage of the plant had been almost completely consumed, and many of the larvae were migrating, forming themselves into living ropes and lowering themselves to the ground. As the nearest thorn bush was some four or five yards away, and the intervening grass was high, they would find some difficulty in attaining their object. However, when I visited the spot, three days later, some of them had succeeded in making the passage. Most of the remaining larvae had then pupated, in the original web. The pupae are quite naked and—like the larvae—are distributed throughout the texture of the web. Moths commenced to emerge on June 28th, and proved to be a pretty little Tineid which has been identified as *Scythropia crataegella*, L., Fam. *Hyponomeutidae*.



Photo: E. R. Green.

Mr. Robert Adkin also exhibited slides and contributed the following notes on them.

“(a) *Lithocolletis concomitella*, Bankes, and *L. blanchardella*, Fab., and of apple leaves mined by the larvae. The leaves of the apple trees growing in my garden at Eastbourne are mined by three species of *Lithocolletis*, viz., *coryfoliella*, Haw., a very distinct species which mines the upperside of the leaves, and *L. concomitella* and *L. blanchardella*, both of which mine the undersides of the leaves. The imagines of these two are not difficult to separate, as they differ slightly in the colour of their wings, and in the former the white basal streak generally connects with the first of the three white dorsal teeth; but he had been unable to detect any character in the larval mine that would separate the two species.

“(b) Larval cases, the female imago and the newly hatched larva of *Luffia lapidella*, Göze., form *ferchaultella*, Steph. The larval cases of this species, he said, occur very commonly on the trunks of the elm trees growing in the roads in the Meads district of Eastbourne, also not infrequently on adjacent trees of other species and on neighbouring walls. The larvae feed upon and cover their cases with a greenish grey, powdery looking, lichenous growth with which considerable portions of the stems of the trees and walls are covered. Of this growth Mr. Robert Paulson writes me, “The green surface consists of the spherical alga *Cystococcus humicola* and of the hyphal cells of a fungus; when the two symbionts are so loosely attached the lichen is without a perfect thallus and is often known as *Lepraria*. It remains in that state as a lichen imperfecti.” *L. lapidella* as known on the Continent of Europe, and I believe also in the Channel Islands, is a sexual species in which both males and females are regularly produced, but the form *ferchaultella*, which appears to be the only form occurring in Britain is a parthenogenetic form, females only being produced. These females on emergence from pupa sit on the old larval cases until they have deposited their eggs in them. The young larvae on hatching crawl out and almost at once construct cases like those of their parents, and so the round goes on year after year without the intervention of the male. But how is the dispersal of such a creature carried out? From its somewhat wide distribution it must have some means of getting from one place to another, sometimes at considerable distances. Is it possible that the larvae have the power of making the necessary journeys, possibly over rough ground for, it may be, a dozen or more yards or perhaps even much longer distances? I see no other solution of the problem.”

[A possible method of distribution would be by wind transference with the emission by the young larvae of a long thread of silk, after the manner of 'gossamer' spiders.—K.G.B.]

Mr. Hawkins remarked on his recent stay in the I. of Wight in September. There was a considerable period of N.E. wind accompanied by frosts so severe as to cause many trees to drop their leaves very largely. Even Ventnor, sheltered as it lies, was by no means unaffected by the bad weather conditions. He saw a few *Aglais urticae*, *Colias croceus*, common "whites" and four *Pyrameis cardui*. Moths were practically absent.

Mr. Blair had also been away near Ventnor, where he found *C. croceus* the commonest species but very few other butterflies. He had seen one *H. peltigera* just taken by a young collector.

Mr. Jarvis exhibited a specimen of the curious coleopteron *Anophthalmus dalmatinus*, Mill. This insect is a member of a small group of cave-dwelling *Carabidae*, and is both eyeless and apterous. The beetles inhabit certain caverns in Southern Europe which belong, geologically, to the pre-glacial age and it has been found that each group of caves has its own individual fauna. The first great discovery was made at Adelsberg about the middle of last century, and since that date new species have from time to time come to light. Recently, however much work has been done in Roumania and Albania by Prof. Jeannel, Herr Winkler and others, as a result of which very many undescribed insects have been found. The specimen exhibited was taken at Kothenice in Dalmatia. No true cave beetles are dwellers in English, German or Scandinavian caverns.

OCTOBER 8th, 1931.

The PRESIDENT in the Chair.

Mr. H. W. Andrews exhibited two species of rare Diptera taken by him in North Kent both new to the county, *Didea alneti*, Fln., and *Echinomyia ferox*, Panz. He also showed a short series of *Tephritis bardanae*, Schk., bred from this year's heads of burdock.

Mr. Barnett exhibited a very dark aberration of *Coenonympha pamphilus*, an example of *Epinephele jurtina* underside with extra spots, and the Kemsing, Kent, race of *Plebeius aegon*.

Mr. M. Niblett exhibited a flower of *Solanum dulcamara* galled by *Contarinia solani*, Rübs., from which there emerged on 1.ix.31 imagines of *C. solani* and some Beetles sp. ?

He also showed flower-heads of *Carduus crispus* with larvae of Trypetids in them from which there emerged on 4.viii.31 a species of Trypetid fly; and also flower-heads of *Senecio vulgaris*, L., galled by a Trypetid fly which emerged on 9.viii.31 together with Braconids, sp.? and Beetles, sp.? on subsequent dates. Both these exhibits were taken at the Box Hill Field Meeting on July 25th.

Mr. H. J. Turner exhibited the curious small "bird's nest" fungus, *Crucibulum vulgare*, on a plant label (deal). The spores are contained in small circular biconvex packets attached to the inside of a small eggecup like growth, like eggs in a nest; a short series of *Heliothis peltigera* bred from West Kent larvae, and larvae of *Cilix glaucata* (*spinula*) just obtained from blackthorn bushes in Surrey. (Second brood.)

Mr. Newman exhibited several examples of *Pyrameis cardui*, typical of a large number he had bred this year from wild larvae.

Mr. S. Wakely exhibited an extremely variable series of *Grapholitha* (*Epiblema*) *nisella* and one specimen of *Argyresthia pygmaeella*, all bred from willow catkins collected at Reigate.

Mr. J. A. Downes exhibited the bulk of the moths taken during a camping tour with a car along the south coast of Dorset and Devon this autumn and communicated the following notes.

"On the journey down we stopped near Bridport and I took a nice aberration of *Ptychopoda biselata* (*bisetata*) much clouded with grey. The first night we pitched our tent at Charmouth; and on the cliffs at ragwort we took, among other things, *Miana literosa* ♂s, and *Noctua umbrosa* (20 ova were found laid singly on leaves of plantain growing in the hollows), *Tryphosa dubitata*, and *Gnophos obscurata*. Lamps produced *Lithosia lurideola* and *Malacosoma neustria*. By day plenty of *Pyrameis cardui* were obtained and four *Colias croceus* (*edusa*) at Salcombe. We expected that Mill Bay would swarm with moths, but the result was very poor; *L. lurideola* was common on flowers of hemp agrimony. South mentions cliffs as localities for *Lithosia caniola*. Two nights' work on the cliffs produced no *L. caniola* but we obtained *Metachrostis muralis* and *Lasiocampa quercus* ♀; by the latter 114 ova were laid in one night. The following night August 17th, we moved to another part of the cliffs and took both sexes of *L. caniola* from which we obtained 100 ova. Does *L. caniola* come to flowers of agrimony as *L. lurideola* does? We took large bundles of agrimony to the cliffs and splashed two of them with sugar, and on these two heads took our *L. caniola* in company with *Mamestra trifolii*, *Agrotis lunigera*, *Acidalia marginepunctata*, and *Gnophos obscurata*. On the unsugared heads our take

was nil. At sugar on a gorse bush we took *Leucania putrescens* on August 21st. August 22nd was a poor night, only 1 *A. marginipunctata* was found on sugared agrimony heads. August 23rd was our last opportunity for night work at Salcombe and we sugared the agrimony again. Two *Plusia ni*, swarms of *P. gamma*, *P. chrysitis*, *Agrotis tritici*, *H. trifolii*, etc., were obtained. During the day we saw six *Colias croceus* and took one ab. *helice*. *Plebeius aegon* was common, *P. cardui* was swarming, *P. atalanta* was fairly common, and *L. quercus* was easy to take in the bright sun on a windy day. On our return, at Charmouth we took *M. literosa* ♀s and *Agrotis ypsilon* (*suffusa*). We spent the last two days of our holiday in the New Forest but obtained no moths though larvae were plentiful. Of the larvae of *Thera obeliscata* two have already emerged (October 8th)."

Mr. C. N. Hawkins exhibited a short series of *Lygria populata*, L., bred this year from Braemar larvae received from Dr. E. A. Cockayne, including smoky and almost black forms, even darker than those shown by Dr. Cockayne himself at the last meeting. A specimen of *Palimpsestis* (*Cymatophora*) *or*, with no white outlines on the discoidal spots and a normal specimen for comparison; bred from Osted larvae, 1931. A very dark *Bryophila perla*, F., from Mitcham Common, 1931. A very pale *Polyphoca flavicornis*, L., ? var. *galbanus*, Tutt, from Wimbledon Common, 1931, and a normal specimen for comparison.

Mr. T. H. L. Grosvenor exhibited examples of a 2nd brood of *Zygaena stoechadis* of S. France origin.

Captain Curwen exhibited specimens of *Melitaea cinxia* taken in the I. of Wight on June 16th. He noted that there appeared to be two groups of imagines, one completely worn and the other quite fresh.

Mr. S. N. A. Jacobs exhibited:—1. Larval cases and imagines of *Coleophora saturatella*, Stainton, from Bromley, Kent. The cases are composed of the excavated leaves of the broom *Cytisus nigricans*; as the leaf is eaten, the skin is retained and a small hole made through one end so that the leaf is threaded asymmetrically on the bottom of the case extending it with each move made by the larva, and allowing for its growth. This insect is not common, and seems to be confined to the South-East of England.

2. Larval cases and imagines of *Coleophora lineola*, Haw. (*croco-grammos*, Zell.) from Bromley, Kent, also living larvae feeding on a cultivated *Stachys* from the same locality. The cases are formed

by the larva uniting the top and bottom skins of the leaf after it has eaten the intervening tissue. The bag so formed is then cut out from the leaf, and as it dries, it forms the basis of the larval case. As the larva grows the size of the case is increased by the thickness of the leaf skin with every move, and in this case moves are frequent, for the larva merely mines a large patch from one position. A common insect, to be found in plenty on the underside of the leaves of *Stachys*.

3. Living larvae of *Coleophora fuscadinella*, Zell., feeding on elm, from Bromley, Kent; also larval cases in the hibernation stage and mature cases with imagines. The living larvae are in the earliest stage when the cases are made from leaf fragments as described for *lineolea*; they are upright, slightly curved and tapering, but as they move from one mine to another the leaf skin rings which are attached to the case gradually extend the case in an obtuse angle making it somewhat pistol shaped, and it is in this case that the larva hibernates, probably attached to a twig. During the winter this brown case becomes black. After hibernation the larva moves to a leaf and affixes the case to the underside of the leaf and starts mining, eventually leaving the case entirely and making a large mine. Having cleared sufficient space, preferably at the edge of the leaf, it unites the top and bottom skins with silk, using the already united edge as one side of its final case, and then as already described, cuts itself out. Thereafter it never leaves the case, and for the purpose of defecation, retires inside, and only extrudes the anal segments from the hinder end.

Mr. Eagles exhibited larvae of *Pygaera pigra* from Epping Forest, and also a series of *Abrostola tripartita*. Of a brood of 42 larvae of the latter species 37 were of the dark form and 5 were light.

Mr. Blair exhibited fully grown larvae of *Apamea unanimitis* from the variegated ribbon grass commonly grown in gardens.

A Report of the Congress of the S.E. Union of Scientific Societies at Winchester in June by Mr. R. Adkin, the Society's delegate, was read.

Dr. Bull reported that *Colias croceus* was flying in Wye, Kent, on August 26th, and in Sussex at Rye in early August, at Halland and Lewes on August 18th, and at Northiam on September 9th.

Still further records of the occurrence of *Polygonia c-album* were reported.

South-Eastern Union of Scientific Societies
 CONGRESS at WINCHESTER
 June 10th-13th, 1931.

REPRESENTATIVE'S REPORT.

The members attending the Congress met at the Abbey House, the official residence of His Worship The Mayor, at 11.30 on Wednesday, an opportunity thus being given for congratulations between many old friends and introductions among new members.

In the afternoon visits, under able leadership, were made to that venerable building, The Cathedral; also to Winchester College and The Guildhall. At the latter the City Plate and many Ancient Charters were on view and their virtues were explained.

In the evening the President, Sir J. Arthur Thomson, M.A., LL.D., having been duly inducted, delivered a most interesting and instructive Address entitled, "Some Natural History Problems of the Countryside"—a simple subject presented in the simplest possible terms, yet of profound interest from beginning to end. It will be printed in full in the "South-Eastern Naturalist" which it is hoped will be published very shortly, and any of our members who take an interest in the problems of the countryside will do well to peruse it carefully.

The more formal business of the Congress began with the Representatives' Meeting at 9.30 on Thursday morning. At this the Council's and Treasurer's Reports were presented and adopted. The Reports of the various Sections were accepted, Officers and Council for the ensuing year elected, and other business of the Congress transacted.

At 10.30 the Botanical and Archaeological Sections held their business meetings, followed at 11 o'clock by their Presidents' Addresses. In the former Mr. James Groves, F.L.S., took for his subject "Stone-worts, Ancient and Modern" and needless to say, kept us fully interested for the three-quarters of an hour allotted to him. This was followed by a paper on "Plants as Civil Engineers" by Prof. S. Mangham of University College, Southampton.

In the Archaeological Section the President, Dr. W. E. St. L. Finny, F.S.A., discoursed upon "The Kings of Wessex from Egbert to Athelstan." He was followed by Dr. Williams-Freeman, F.S.A., with a paper on "Pre-Roman Winchester." A paper on "The Pre-History of the Village Church (Part 2)" by the late A. Hadrian Allcroft, was communicated and ordered to be printed.

In the afternoon an Archaeological excursion to Romsey was held, the chief points of interest connected with the fine old Abbey being pointed out by the Vicar, the Rev. W. G. Corban, and others well versed in its history. Tea at a local inn, a visit to King John's House, now under renovation that is being undertaken with a view to restoring it as nearly as possible to its original condition; and a delightful drive home through some of the most beautiful parts of the forest, brought a full afternoon to a conclusion.

The Geologists visited "The Purbecks of Salisbury" under the leadership of Mr. F. W. Anderson, M.Sc., Lecturer in Geology at University College, Southampton: while the Botanists, who of all the sections probably took their ramble the most seriously, were led by Prof. S. Mangham.

In the evening a Reception was held in the Guildhall when the Representatives and other Members of the Congress were entertained by the Mayor and Mayoress, Councillor W. Hamblin and Mrs. Hamblin, in true mayorial fashion, and a very pleasant evening was spent by all present. These social gatherings fulfil a special function in that they afford an opportunity for members to meet one another in circumstances favourable to the formation of friendships and so forth, not otherwise obtainable.

On Friday morning the Geological Section met at 9.30 for the transaction of their routine business. At 10.30 their President, Prof. H. L. Hawkins, D.Sc., F.G.S. (University of Reading), gave an address on "Some Generalisations on the Nature, Deposition, and Palaeontological Implications of the Chalk," and this was followed by a paper by Mr. F. H. Edmunds, F.G.S. (of the Geological Survey of Great Britain), on the "Relation of Soil and Geology of the Weald"—botanists being specially invited to attend.

The Zoologists did not meet until 10 o'clock and having comfortably disposed of their routine business within the half hour allotted to it, their President, Mr. John F. Marshall, F.L.S., F.E.S., made some explanatory remarks on a series of Spectroscopic Photomicrographs of Fossil Insects that he was exhibiting in the Congress Museum, thus adding much to their value. He was followed at 11 o'clock by our esteemed member Mr. Hugh Main, F.E.S., F.Z.S., who gave a lantern lecture on "Insect Observations Underground" on which he was highly complimented by the President of the Congress who happened to be present among the audience. The very full morning's business was brought to a close by a paper by Mr. Edward A. Martin, F.G.S., on "The Making of Pearls."

The afternoon was again devoted to excursions to places of interest in the neighbourhood. The Archaeologists visiting the Underground Church at Chilton Candover where Mr. T. D. Atkinson, F.R.I.B.A., acted as guide: and Old Basing Ruins where Mr. G. W. Willis gave a long and interesting account of their history. The Geologists went to Chilcomb Valley and The Chalk, under the direction of Mr. F. W. Anderson, M.Sc. The Botanists were conducted *via* the Water Meadows to St. Catherine's Hill by Miss C. A. Kingsmill and Miss Williams. And the Regional Survey Section very properly paid a visit to the Ordnance Survey Office at Southampton by permission of Col. G. S. C. Cooke.

It has been the custom for some years past to hold at least one Public Lecture during the Congress, to which students and pupils are specially invited, and judging by the large audiences, especially of the younger people, and the enthusiasm displayed by them, this has proved an unqualified success. On this occasion it took the form of a lantern lecture on "A Motor Tour of 7500 miles from the Transvaal to Western Uganda" by Mr. W. P. D. Stebbing, F.G.S., and proved no exception to the general rule.

On Saturday morning the adjourned Representatives' Meeting was held at 9.30, and the remaining routine business having been disposed of, an Address was given and a discussion initiated by Sir Lawrence Chubb, on the "Preservation of the Countryside, its Foot-paths, Village Greens, Commons, The Rights of Way Bill, The Rural Amenities Bill, etc.:" and was continued by Sir Edgar Bonham Carter, K.C.M.G., and others, and had not concluded when the Regional Survey Section should have commenced their proceedings at 10.30. Fortunately, each Section has its own meeting room, consequently if one is late it does not interfere with the work of the other, and so the morning's programme was carried through without difficulty.

In the afternoon a general excursion was carried out under the leadership of Dr. Williams-Freeman, F.S.A., when Merdon Castle, Longstock, The Valley of the Test, and several other objects and places of interest were visited, and on the return of the party to Winchester a very successful Congress was brought to a close.

The next Congress will be held in London at the rooms of the Civil Service Commission, Burlington Gardens, on June 1st to 4th, 1932. There is ample accommodation there for all the activities of the Congress. Visits to various places in and around London are

in course of arrangement, and it is hoped that in such a central and convenient locality it will be the endeavour of every member of every affiliated Society to become a member of the Congress and thus ensure its success.—ROBERT ADKIN.

OCTOBER 22nd, 1931.

ANNUAL EXHIBITION MEETING.

The meeting was quite informal and took the form of a *Conversazione*. The large number of exhibits were placed on tables. Light refreshment was served during the evening.

Mr. R. Adkin exhibited a cabinet drawer containing long and varied series of *Dysstroma* (*Cidaria*) *truncata*, *D. (C.) citrata* (*immanata*), etc., from Scottish Islands and Mainland, Irish and English localities.

Mr. H. W. Andrews exhibited some examples of Acalyprate Muscids (Dip.), *Cordyluridae*, *Helomyzidae*, and *Dryomyzidae*.

Mr. S. R. Ashby exhibited four drawers of British Coleoptera (from the late Mr. W. West's Collection), viz., *Carabidae*, *Dytiscidae*, *Gyrinidae*, and *Hydrophilidae*.

Lieut. E. B. Ashby exhibited (1) A series of the spring brood of *Polyommatus* (*Agriades*) *thersites* from the Aigle District of the Rhone Valley, taken in May, 1931. (2) A series of *Adopaea lineola* from the old localities Leigh-on-Sea and Hadleigh, Essex, in which neighbourhood the species is still quite abundant.

Mr. T. L. Barnett exhibited a series of *Coenonympha tiphon* from Rannoch, and Thun Wæste, North Shropshire, also a long series of *C. pamphilus* from various places in Kent and Surrey, including 3 females with brownish upper side, and one male with 4 spots on upper side of hindwings. Also a long series of *Ematurga atomaria* from Kent, Surrey, and Cambs., chalk and heather forms.

Mr. E. J. Bedford exhibited his series of very fine water colour drawings of British Orchids.

Mr. K. G. Blair exhibited:—1. *Agdistis staticis*, Mill. and *A. bennetii*, Curt., two British species of *Pterophoridae* the first of which had only quite recently been identified as British. 2. Galls of *Lipara lucens* on common reed, with the flies, parasites and imagines reared from them. Also galls of *L. rufitarsis* from the same plant, with the flies reared from them. 3. Some other galls on Grasses.

Mr. S. F. P. Blythe exhibited (1) A series of *Erebia scipio* from

Beauvezer caught in July, 1931. (2) An aberration of *Melitaea didyma* from Beauvezer with black blotches on primaries, 14.vii.31. (3) A very dark aberration of *Melanargia galathea* from Digne, 5.vii.31.

Mr. A. A. W. Buckstone exhibited aberrations of spring, summer and autumn broods of *Pararge aegeria*, aberrations of *Polyommatus thetis* (*bellargus*), asymmetrical examples of a number of species of Lepidoptera, also living larvae, pupae and imagines of *Pararge aegeria* and *Pyrameis atalanta*.

Dr. G. V. Bull exhibited a series of females of *Cosmotriche potatoria* from W. Kent localities varying from a light sandy tone to quite brown in coloration; and an aberration of *Brenthis selene*.

Mr. L. C. Bushby exhibited living Locusts and Scorpions.

Captain B. L. Curwen exhibited numerous forms of *Polyommatus coridon* taken on the Sussex Downs including ab. *fowleri* ♂ and ♀; two specimens near *fowleri* ♂ ? var. *indistincta*, Tutt; var. ab. *cinnus* 2♂♂ 1♀; two ♀ ab. obsolete forms; ab. *parisiensis*: a ♂ ab. *striata*, this specimen he claims is the most remarkable striate form which he can find any record of so far as *coridon* is concerned; a ♂ ab. *biarcuata*; a ♀ ab. *costa-juncta*, a ♂ and two ♀ *anticoextensa* forms and an ab. ♂ *fulvescens* with ♀ coloration on underside.

Mr. J. A. Downes exhibited an example of the rare immigrant *Sterrha sacrararia* ♂, taken at Wimbledon Common 23.vi.31, and a selection of moths taken by night on cliffs near Salcombe, Devon, at sugared flower-heads of hemp agrimony, mid-August, 1931, including two of *Plusia ni*, *P. gamma*, *P. chrysitis*, *Agrotis lunigera*, *A. tritici*, *Miana literosa*, *Mamestra trifolii*, *Acidalia marginepunctata*, *Lithosia caniola*, and *Leucania putrescens*.

Mr. J. O. T. Howard exhibited an underside var. of *Brenthis euphrosyne*, taken in the New Forest, 30.v.31. *Aphantopus hyperantus*, var. *caeca*, etc., from Salisbury Plain and New Forest, July, 1931, and *Orgyia antiqua* ♀, with the larval head still adhering; it was taken while egg-laying in Regent's Park, 7.viii.24.

Mr. C. N. Hawkins exhibited a collection of Preserved Larvae of Lepidoptera including the following species: *Papilio machaon*, L., *Metopsilus* (*Theretra*) *porcellus*, L., *Dilina* (*Mimas*) *tiliae*, L. (forms), *Mamestra contigua*, Vill., *Epineuronia* (*Heliophobus*) *popularis*, F., *Caradrina morpheus*, Hufn., *C. ambigua*, F., *C. taraxaci*, Hb., *Dichonia* (*Agriopsis*) *aprilina*, L. (forms), *Dianthoecia capsicola*, Hb. (forms), *D. albimacula*, Bork., *Xylocampa* (*Xylina*) *areola*, Esp. (forms),

Pyrrhia umbra, Hufn. (forms), *Toxocampa pastinum*, L. (forms), *Eucosmia cervinalis*, Scop. (*certata*, Hb.), *Eustroma silaceata*, Schiff. (forms), *Lygris prunata*, L. (forms), *L. populata*, L. (forms), *L. pyraliata*, Schiff., *Semiothisa notata*, L. (forms), *Eupithecia pulchellata*, Steph., *E. venosata*, F., *E. absinthiata*, Cl. (forms), *E. denotata*, Hb., *E. castigata*, Hb., *E. satyrata*, Hb. (forms), *E. succenturiata*, L., *E. subumbrata*, Schiff., *E. nanata*, Hb. (forms), *E. abbreviata*, Steph. (forms), *E. sobrinata*, Hb. (forms), *Chloroclystis coronata*, Hb. (forms).

Mr. O. J. Janson exhibited *Papilio aristor*, a male and two females from Hayti, described by Goedart in 1819, whose type in the Paris Museum is lost or destroyed, only one male has been known previously; and other scarce *Papilio* species.

Col. S. H. Kershaw exhibited an example of the Scottish form of *Euphyia corylata*, known as *albocrenata*, Curt. (*effusaria*, Stdgr.).

Mr. H. A. Leeds exhibited the following *Rhopalocera*, taken during the season of 1931.—*Melanargia galathea*, ♀ upperside, with black markings intensified; ♀ underside, all markings very faded.

Aphantopus hyperantus, ♂ underside, with an additional black spot and a pale ring between second spot and border of right forewing.

Strymon pruni, ♀ undersides, with lighter ground colour than is usual and the bands pale orange, and a ♀ in which the colour of band on left hindwing graduated from straw to bright orange.

Polyommatus coridon, ♂ uppersides, abs. *pallidula*, *pallidula-iridescens* and *caeruleo*, and undersides, *dextroalba*, *obsoleta*, and ♂ with dark brownish-fawn hindwings. ♀ uppersides, *atrescens-anticodestro-inequalis*, and one with much paler brown ground, and a ♀ underside, *glomerata-bi-I-nigrum*.

Polyommatus icarus; abs. *obsoleta*; *elongata-anticoradiata*; *supracaeerulea*.

Plebeius medon, a large ♀ (30mm.) with antemarginal band well developed.

Plebeius aegon, a gynandromorph, right wings ♂, left forewing, upperside, costa very broadly female, also lower portion of outer border with three reddish lunules, remainder of wing mainly male scaling, the underside showing same areas of sexual differentiation; left hindwing upperside slightly female on upper parts of outer border with one reddish streak, but the underside of this wing brownish female ground, left antenna shorter than right; right side of body similar to ♂ with end strongly tufted, left side similar to ♀ and not tufted.

Cupido minimus, abs. *parripuncta*, *postico-obsoleta*, *sinistro-obsoleta*, *obsoleta*, *caeca*, etc.

Rumicia phlæas, ♂ upperside, *partimradiata*.

Coenonympha pamphilus, ♂ underside, lower two-thirds left forewing straw colour.

Mr. H. B. D. Kettlewell exhibited long series illustrative of his collecting in 1931 including series of *Melitæa athalia*, *M. cinxia*, *Brenthis selene*, *B. euphrosyne* (with a black banded ♀), *Phryxus livornica* bred from a larva, *Smerinthus populi* bred from a dark ♀, *Hemaris fuciformis*, *H. tityus*, *Macroglossum stellatarum*, *Sphinx pinastri*, *S. ligustri*, *Spilosoma menthastri* Scotch forms, *S. urticae*, *Dianthoecia irregularis*, *D. albimacula*, *Pachetra leucophaea*, *Lasiocampa quercifolia*, *Zygæna purpuralis*, *Boarmia repandata*, etc. A case of varieties of *Pachygastris trifolii* from E. Kent and also of *Nonagria sparganii* from Kent. With a large number of species captured in the spring in Scotland including *Asteroscopus nubeculosa*, *Nyssia lapponaria*, *Lycia hirtaria*, *Taeniocampa gothica* and ab. *gothicina*, *T. incerta*, *T. leucographa*, *Endromis versicolor*, *Polyplocia flavicornis*, etc.

Mr. W. J. Lucas exhibited:—1. A drawing of Brookley Bridge, Brockenhurst, about 1894. 2. Drawings of the Neuroptera, *Psectra diptera*, *Osmylus fulvicephalus*, *Drepanopteryx phalaenoides*. And aberrations of some British Lepidoptera.

Mr. D. L. Clapson exhibited:—1. Slough of a grass-snake. 2. Skin of an adder. 3. Lichen, "Lungs of Oak." 4. Lichen, "Old Man's Beard," with fructification. 5. Lichen *Illecebrum verticillatum*. 6. Moss, *Thuidium tamariscinum*. 7. Moss, *Hylocomium loreum*. 8. Moss, *Racomitrium purum*. These eight exhibits were partly to illustrate a method of utilising old photographic plates on which they were mounted.

Mr. F. W. McDonald exhibited a large number of Exotic Insects.

Mr. Hugh Main exhibited living insects and spiders in his terraria.

Mr. Marchant exhibited *Diacrisia sanio* ♂ without the usual dark marking and marginal band on the hindwings, from Kent. Seitz names this form *irene*, Butlr.=*immarginata*, Niepelt, and states that it occurs in Japan where it has been considered a true species.

Mr. H. Moore exhibited Lepidoptera, Hymenoptera and Orthoptera from the West Indies to show local and insular forms of various species.

Mr. B. M. Morley exhibited a selection of his captures of moths in E. Kent during 1931, including—

Polyommatus thetis (*bellargus*) ♀ underside variety. Folkestone, 26.8.31: *Diphthera alpium* (*orion*) Weald of Kent, bred, larva 29.8.30, imago 15.6.31: *Rhyacia xanthographa*, unusually pale form, an example of albinism, Folkestone, 30.8.30: *Triphaena* (*Rhyacia*) *pronuba*, hindwings suffused with dark, Folkestone, bred, larva 18.4.31, imago 10.7.31: *Chloridea peltigera*, ♀, dark form, Romney Marsh, bred, larva 1.8.31, imago 5.10.31: *Sideridis faricolor*, ♂ North Kent, 1.7.31: *Nonagria* (*Archanara*) *sparganii*, Romney, Marsh, 7.8.31; ♂ ♀ var. *rufescens*, ♂ var. *bipunctata*: *Sideridis straminea*, ♂, Romney Marsh, 26.8.31, dwarf form with a strongly marked line: *Ennomos autumnaria*, ♂ ♂ ♀ ♀, August, September, 1931, four rather heavily marked specimens bred from ova of a Folkestone ♀: *Abraxas grossulariata*, ♂, Folkestone, 11.7.31, a rather heavily marked specimen bred from wild larva; *Lasiocampa trifolii*, ♀, Romney Marshy, 12.8.31, at light, var. *flava-obsolata*: *Phryxus* (*Celerio*) *lineata* (*livornica*), empty pupa case, larva Romney Marsh, 31.7.31, imago (forced), 19.10.31.

Mr. W. Gifford Nash exhibited *Hyloicus pinastri* and ab. *unicolor* from Suffolk, *Phryxus livornica* from the Isle of Wight, 4 *Melitaea cinxia* showing homoeosis, and 4 *M. athalia* showing the same; a pale aberration of *Eugonia polychloros*, 3 pale and 1 very dark *Adopaea lineola*, a pale *A. flava* (*thamias*), aberrations of *Coenonympha pamphilus*, a *Strymon w-album* with the red band on hindwing absent, ab. *suffusa* of *Polyommatus coridon*, underside aberrations of *P. icarus*, a yellow form of *Zygaena filipendulae*, and aberrations of *Z. trifolii*.

Mr. W. J. Newell exhibited the Life-histories of several species of Lepidoptera.

Mr. L. W. Newman exhibited 1. *Arctia caja*, a series of abs. both red and yellow forms with forewings nearly all white and hindwings with only one or two spots in centre. 2. *Callimorpha dominula* with all spots a deep orange also large spotted and ab. *rossica*. 3. *Papilio machaon*, series bred from Norfolk strain including a fine black ab. 4. *Pieris napi*, banded abs. 5. *Polyommatus icarus*, some fine abs. *caerulea*. 6. *P. thetis* underside abs. including *obsolata*, etc. 7. *Satyrus semele*, a long and varied series captured in North Kent, July and August, 1931.

Mr. L. Hugh Newman exhibited:—1. *Polyommatus icarus*: a long and very varied series collected in the Isle of Herm, August, 1931. 2. *Lycaena boetica*, a fine bred series from a ♀ taken in the Isle

of Sark. 3. *Pararge aegeria*, a bred series from a ♀ taken in the Isle of Sark.

Mr. M. Niblett exhibited numerous plant galls and their makers, both Hymenoptera and Diptera.

Mr. C. Priest exhibited *Colias croceus*, *Pyrameis cardui*, *Melanargia galathea*, *Pararge aegeria*, and *Aricia medon* all taken at Ventnor on September 21st, 1931; *Bryophila muralis* from Ryde, August 17th; and a short bred series of *Amorpha populi* from Wimbledon including a nice pink female form.

Mr. R. A. R. Priske exhibited a set of photographs of S. African animals taken in the wild, and a small collection of the shells of British Molluscs.

Mr. W. Rait-Smith exhibited *Coenonympha pamphilus*, a homoeotic example. Two splashes of upperside colour on underside of left hindwing; it was taken at Royston, 31.vii.1930. *Leptosia sinapis*, an extremely rare homoeotic example, a large patch of underside colour on right hindwing, taken at Galway, June, 1931, and *Arctia caja*, an extremely melanic specimen, Rochester, bred July, 1931.

Mr. S. G. Castle-Russell exhibited:—

1. Two aberrations of *Aglais urticae* on behalf of Mr. A. G. B. Russell, M.V.O. The first form was taken in the grounds of Scar Bank House, 19.ix.31. The two central black spots on the forewings absent. The two largest costal black blotches, nearly confluent and separated only by a series of four small blackish straw-coloured spots. The black border in its upper portion crossed with straw-coloured markings. In the hindwings the upper end of the submarginal orange-red band nearly black. The second was taken by Mrs. A. G. B. Russell in the same place on 24.ix.29. The outer area of the forewings, within the margin, white in place of orange-red. The area between the two inner costal blotches a pale straw-colour.

2. Coloured figures of British Rhopalocera executed by exhibitor comprising *P. napi*, *A. paphia*, *A. aglaia*, *A. adippe*, *A. iris*, *P. C-album*, *A. coridon*, *C. palaemon*, *H. lucina*, and Heterocera *H. fuciformis*; on behalf of Mr. N. G. Wykes, B.A., an aberration of *Essuraria corylata* taken at Aldershot, 1.vii.1931; and a box of Indian Rhopalocera, on behalf of Col. S. H. Kershaw, D.S.O.. An aberration of *Brenthis euphrosyne* with absence of spotting on forewings, suffused and rayed hindwings, West Surrey, June, 1931; three forms of *Brenthis selene*, West Surrey, June, 1931, on behalf of Mr. F. Housden, B.A. Six aberrations of *Aglais urticae*, three

being of similar form to that figured in Frohawk's "British Butterflies," Collingbourne, Wilts, June, 1930; an extreme aberration of *Brenthis selene*, heavily banded and marked with black, Collingbourne, June, 1930; an aberration of *Argynnis aglaia*, partly suffused with black, and an extremely pale form of male *Agricides coridon*, Wilts, August, 1930, on behalf of Lieut. C. G. Lipscombe.

Mr. E. Scott exhibited butterflies taken at Digne during June, 1931.

Mr. Clifford Wells exhibited British Butterflies taken in 1931 including a fine aberration of *Argynnis aglaia* from Berks.

Mr. S. Wakely exhibited four cases of lepidoptera (236 different species) taken in East Essex in recent years, and including: *Adopaea lineola*, *Palimpsestis octogesima*, *Malacosoma castrensis*, *Xylophasia scolopacina*, *Hydriomena ruberata*, *Percnoptilota fluvjata*, *Alencis pictaria*, *Ennomos autumnaria*, and *Pyrausta verbascalis*. Also larvae of *Euchloris smaragdaria* bred from ova.

A male *Cirrhia citrigo* and female *Eumichtis protea*, taken in copula at Shirley, Surrey, on September 9th, were also shown.

Mr. A. J. Wightman exhibited a large number of British Noctuae comprising short series selected more with a view to showing extreme forms, than forms in sequence.

1. *Taeniocampa gracilis* form *rufescens*, Ckll. (*Ent.* XXII. 4) New Forest; = sub var. *brunnea*, Tutt; one with a distinct admixture of grey and red scales, another not unlike some *T. stabilis* forms; others hardly red at all; some pink, and some probably what Cockerell called *rufescens*.

2. *T. gracilis*, Pulborough, Sussex; some showing the yellowish ground colour so often present in Pulborough forms, one with a bluish tinge; another with pink and bluish scales intermingled; another with orange suffusion; one pink suffusion; others as red as many New Forest forms but not the same shade, more yellow in base, producing terra cotta shades. Note darker hindwings here than in the darkest of the New Forest forms.

3. *Agrotis ripae*. All from a single Sussex locality; one bluish white; another *cinerea*-like; one pink; another dark chevrons; one smoky ochreous brown; another with central fascia pale; and one rayed with brown, pale nervures. All these forms have pale costa.

4. *Agrotis cinerea* ♀ ♀, E. Sussex. The forms were pale silvery grey ground colour, submarginal area, central shade and basal line in dark brown; pale brown ground colour, otherwise as last; outer

half of wing darker brown than basal half, with well developed central shade in brown; as last but dark basal area brown and grey; submarginal area, central shade and basal area dark blackish brown on pale grey, a striking contrast; as above but with more tendency for whole of outer half of wing dark brown, inner half pale brownish grey as last but without contrast and tendency to be unicolorous; pale base, slightly darker outer margin, still darker submarginal area and very dark central fascia; as last, but here submarginal area is darkest part of wing, transverse lines edged in pale brown; tending to black but with pale basal area central fascia darkest part of wing.

5. *Agrotis vestigialis*, South Hants. Series showing general range of colour, great variation in small points, but very few distinctive forms. Darker central fascia (banded form); yellow blotch at base, transverse lines obsolete compared with last; one with greenish tinge; another with claviform extended; some with dark costa.

6. *Aporophyla lutulenta*, Hoy, Isle of Man and Sussex. Quite different grey form bred from Sussex wild taken larvae; one tends to be unicolorous; some have dark central fascia; others with transverse lines paler on mousebrown; and unicolorous blackish brown forms.

7. *Xanthia aurago*, W. Sussex. In this short series of 13 there are 12 shades of colour in the bands (inner and outer) and 10 shades of colour in the central fascia, in following notes dark inner and outer areas are called "the bands."

Thirteen forms selected from a series of 150, all bred from ova, but also to be taken in all forms:—Pale pink bands, pale orange central fascia; blackish purple bands, deep orange central fascia; pale red bands, rich yellow central fascia; red bands, lemon yellow central fascia; purplish bands, unicolorous lemon yellow central fascia typical *aurago*, Fab.; rich pinkish red bands, reddish orange central fascia ab. *unicolor*, Tutt.; orange suffused bands, orange central fascia, extreme ab. *virgata*, Tutt.; bluish purple bands, deep orange central fascia; red bands, deep orange central fascia, dusted heavily with red, *pale* basal area; red bands, deep orange central fascia heavily dusted with red and *dark* basal area; red bands, deep orange central fascia heavily dusted red and *dark* basal area, an extreme form leading to ab. *fucata*, Esp.; bluish purple bands, smooth unicolorous orange central fascia ab. *rutilago*, Fab.; red bands, red central fascia; only transverse lines in yellow = ab. *fucata*, Esp.

8. *Xanthia fulvago*, Sussex. Two distinct shades in ground colour, many shades of colour in darker markings.

9. *Heliothis peltigera*, Kent. Forced 100 F., dry heat, fair sample of the brood of 47. Markings in red; in brown; central shade developed; inclined to unicolorous reddish; inclined to unicolorous red; dark inner area; especially pale outer area; form reminding one of the allied *dipsacea*.

10. *Phragmatiphila typhae (arundinis)*, Pulborough. Rich red; rich ochreous; pale brown; typical form.

11. *P. typhae (arundinis)*, Norfolk. Five deep brownish red and blackish red abs.

12. *Nonagria cannae* (correctly *N. algae*, Esp.) Norfolk. Five distinct colour forms, every intermediate occurs.

13. *N. sparganii*, Sussex. Five colour forms, cream, yellow, pink, copper-red and red, at least 16 distinct colour forms occur.

14. Five differently marked forms of the same species, Sussex. ab. *obsoleta*, Tt., ab. *bipunctata*, Tt., extra marks in outer marginal area; ab. *nigrostriata*.

15. *N. neurica*, Hb. Five colour forms, all that occur or are known, E. Sussex. Typical form and slight modification; ab. *rufescens*, Edel., ab. *fusca*, Edel., ab. *nigra*, Whtm.

16. *N. dissoluta*, Tr., Yorkshire. ab. *lutea*, Whtm.; ab. *arundineta*, Schmdt.; typical *dissoluta*, Tr.; a large number of other forms occur.

17. *Senta maritima*, Sussex. Two different forms of ab. *wismariensis*, Schmdt.; typical *maritima*; and ab. *nigrostriata*.

18. *Leucania straminea*, Sussex. A pale form; typical *straminea*; ab. *rufolinea*, Tutt; ab. *nigrostriata*, Tt.; combination of *rufolinea*, Tt., and *nigrostriata*, Tt.

19. *Leucania turca*, S. Hants. ab. *lutescens*, Tt.; ab. *lutescens*, Tt., but strong transverse lines; ab. *lutescens*, Tt., but darker central fascia; red typical form; = ab. *immaculata*, Whtm.

20. And other species.

Dr. H. B. Williams exhibited:—1. A series of *Calymnia pyralina* bred in 1931 from Surrey larvae; of 100 larvae 20 were parasitised. It is usual to find a considerable proportion parasitised when, as in this case, full-fed larvae are collected. If young larvae are obtained they are usually free from this infection. The parasites (Dipterous) had not yet emerged.

74 pupated and from these pupae 66 imagines were bred, *i.e.*, 28 true *pyralina*, View., =42·4%, and 38 ab. *corusca*, Esp. =57·6%.

ab. *corusea* is the usual reddish British form and Tutt (*Vars. Brit. Noct.* III. 20) says that the type is "apparently very rare in Britain." This appears to be so, but it is bred and taken annually in certain Surrey localities, though usually in a much smaller proportion than the variety.

The series is exhibited as bred, and contains no extreme forms but does fairly illustrate the normal variation.

2. Short series of *Agriades coridon*:—(a) from West Sussex, 28.viii.1931, including a pale ♀ and a ♀ underside combining abs. *glomerata*, *costajuncta*, and *obsoleta*. (b) from East Sussex, 10 and 16.ix.1931, on the latter of which dates the species was still emerging.

3. *Polyommatus icarus*. Various minor forms taken in 1931 including ♀ ab. *basijuncta* and a ♀ combining ab. *costajuncta* with partial obsolescence in spotting.

4. A short series of *Epinephele jurtina* ♀ ♀ taken in East Sussex, September, 1931, including 7 ab. *addenda*, all taken within a very restricted area.

5. Short series of *Agriades thetis*, Eastbourne, September, 1931. Very few blue ♀ ♀ were seen and no striking aberrations.

6. *Cosmotriche potatoria* bred N. E. Surrey, 1931, including a pale yellow ♂, a yellow ♂ heavily clouded with grey, a very dark ♂, buff ♀ ♀ and other ♀ forms leading up to a wholly brown one.

Mr. C. H. Williams exhibited aberrations of *Polyommatus coridon* and of *Abraxas grossulariata*.

Mr. A. N. C. Witting exhibited various forms of *Coenonympha pamphilus* including a very pale example; series of *Rumicia phlaeas*, *Strymon w-album*, *Plebeius aegon*, and *Pieris napi* mostly bred, and a curious diaphanous ♂ of the last species bred from W. Kent.

Mr. H. Worsley-Wood exhibited preserved larvae of *Cucullia chamomillae* to show the range of variation.

Mr. Chas. de Worms exhibited:—1. A series of aberrations of *A. coridon* taken in 1931 including ♂ uppersides ab. *livida*, ab. *fowleri* and ab. *punctata*; ♂ undersides ab. *obsoleta*, ab. *cinnus*, ab. *confluens*, ab. *arcuata-basijuncta* and various obsolescent forms; ♀ uppersides various degrees of blue suffused forms; ♀ undersides ab. *arcuata-basijuncta* and obsolescent forms.

2. Aberrations of *Melitaea cinxia*, *Aglaia urticae* f. *immaculata*, *Colias croceus* f. *helice*, a bred *Parascotia fuliginaria* with the black markings in waves, a bred series of *Nonagria typhae* including f. *fraterna* from pupae found at Milton Park, Egham, in August and September, 1931, and forms of *Melitaea athalia*.

Mr. A. de B. Goodman exhibited examples of the genus *Colias*. The examples shown are those of a number of species taken in the Palaearctic area, and are as follows:—

1. *Palaeno*, which is taken at high altitude in Europe and apparently shows little variation in different localities. *Orientalis* described by Staudinger as being of smaller size. It is difficult to understand why occasional specimens being of small size due probably to malnutrition should be dignified with a varietal name.

2. *Cocandica* race *mongola*; this seems to be a good species.

3. *Sieversi*, a female example only is shown which I think taken in conjunction with the description of the male is worthy of specific rank.

4. *Christophi*, this also is a good species, but the question arises whether *ladakensis* is a separate species or a sub-species.

5. *Melinos* and *phicomone*, it will be seen that European forms of *phicomone* vary to some extent, this undoubtedly being due to their localisation and to the altitude. The species *melinos*, examples shown from the Altai Mountains show a marked resemblance to *phicomone*. It would be interesting to know upon what ground other than that of locality that *melinos* is regarded as a good species.

6. *Hyale*, this is a widely distributed species and shows little variation throughout its range, excepting in the case of *sareptensis*, which is a deeper yellow in the male. It should be borne in mind however that the species *erate*, flies with *sareptensis*. Great difficulty is found in distinguishing between *sareptensis* and *erate* from description, and the question arises whether they are one and the same thing. The female of *sareptensis* it will be observed is of a lighter colour while in the case of *erate* certain females which could most certainly be passed as females of *sareptensis* have been described under the name of *pallida*.

With regard to *hyale* ab. *pallens* this is another aberration dignified with a varietal name due to its smallness in size and pale coloration.

7. *Eogene*, this is undoubtedly a good species but it is difficult to understand why apart from the different localities the following are not regarded as local races, that is in the case of *thisoa* and possibly *wiskotti*.

8. *Fieldii*, this species occurs in Northern India and differs from *croceus* in the richness of colour. It agrees with *croceus* in having a white form of the female. *Croceus* however, is a widely distributed and migratory species and shows little variation. Assuming that

fieldii is a good species in spite of its near affinity to *croceus*, it is difficult to understand why *myrmidone* from the Altai Mountains and *romanovi* from the Chumbi Valley, Thibet, should be given specific rank apart from the reason of their being in different localities. I should like to draw attention to the very small specimen of *croceus* taken at the Pont-du-Gard, South France, which is undoubtedly a specimen produced by malnutrition. It seems inconceivable that anyone would be so foolish as to give this specimen a varietal name, though I think it can be agreed that from a point of view of smallness of size it compares favourably with the named forms *palaeno* ab. *orientalis* and *hyale* ab. *pallens*.

NOVEMBER 12th, 1931.

The PRESIDENT in the Chair.

The much regretted decease of Mr. Edward Step, who joined the Society in 1872 a few months after its inception, was announced.

Mr. Wakely exhibited a short series of *Polyphloca* (*Asphalia*) *diluta* taken at light around Wimbledon.

Mr. Buckstone exhibited an American cockroach sp. ? found among bananas.

Mr. Robert Adkin exhibited a series of seven specimens of *Epunda lichenea*, Hb., taken at light in his garden at Eastbourne between September 18th and October 11th last, and read the following note.—
 “*Lichenea* appears to be a fairly common species in the Isle of Wight, Devon and Cornwall, but in the Victoria History of the County of Sussex we read “Very rare; reported from Abbot’s Wood,” and my experience of the past thirty years had almost led me to believe that this statement was correct, for during that time I had met with only three specimens, *viz.* one at rest on a door post in 1916, one resting on a railing in 1922 and one at light in 1923, and some of my friends who have worked the neighbourhood pretty thoroughly told me that they had seldom met with it, others that they had not found it at all. From the middle of September to the middle of October last I was working a small and inefficient light trap intermittently in one of the windows of my house; not many insects came to it, and with the exception of *Plusia gamma*, *lichenea* was the most frequent. It would therefore appear that a species that has apparently been quite rare in the County has suddenly become fairly common, in other words, a larger number of individuals have turned

up in the course of a month in 1931 than I have been able to collect records for during the previous fifteen years. There must be a reason for this apparently sudden increase and there are, I think, three possible solutions of the question. There is always a possibility that a species that has for a time just managed to maintain a footing in a district may, owing to some alteration in its natural surroundings, become rapidly more numerous; it might be so in this case but I know of no circumstance that would suggest its probability. Then again, a species may sometimes appear to be rare because we are not sufficiently well acquainted with its habits to know how to take it; it is possible that, like some other species, *lichenea* has an early morning flight and if so the fact of the trap remaining lighted till well after sunrise might be the cause of the captures; unfortunately I am unaware at what time the insects entered the trap. And again, there is the chance that migration may be at the root of the matter; as the species appears to occur chiefly on the coast this would not be an improbable explanation.

Mrs. Grant read a short paper "Notes on Aquatic Hymenoptera" and illustrated it with explanatory lantern slides. (See p. 23.)

NOVEMBER 26th, 1931.

The PRESIDENT in the Chair.

Mr. F. Ballard of Kingston, and Mr. W. D. T. Young of Carshalton Beeches, were elected members.

Mr. R. Adkin presented the Report of the Conference of the Corresponding Societies of the British Association at their Meeting in London, September, 1931. (See below.)

Mr. Downes exhibited examples of *Thera obeliscata* from both pine and spruce, and ova of *T. juniperata* from juniper on Riddlesdown, with a series of the latter species captured at the same place. He also showed larvae of *Cerigo matura* from Riddlesdown and ova of *Himera pennaria* from Wimbledon.

Mr. Syms exhibited the woodland cockroach *Plectobius panzeri*, a form between the typical one and var. *nigripes*, taken at Brockenhurst, July 28th, 1931.

Mr. A. A. W. Buckstone exhibited *Pyrameis cardui*—(1) Two sandy coloured specimens bred from Herne Bay larvae, July, 1931, one being undersized with hindwings "smoky" and several of the spots striated, the zigzag line on disc of wings being absent. In

addition these hindwings are in shape somewhat like those of a *Papilio*. (2) A specimen bred from an Oxshott ovum July, 1922, having an additional small white spot on the outer area of the underside of the forewings, making four of these spots as in *Vanessa atalanta*.

BRITISH ASSOCIATION REPORT.

Report of the Society's Delegate to the Conference of Corresponding Societies, held during the Centenary Meeting of the British Association, London, September 23rd-30th, 1931.

The delegates met in the Jehangier Hall in the Imperial Institute on the afternoons of Thursday, September 24th, and Tuesday, 29th; both meetings were unusually well attended.

At the former, the President of the Congress, Sir Arthur Smith Woodward, F.R.S., delivered an address on "Geology as a Subject for Local Societies" in which he pointed out that the excavations for the construction of arterial roads, for numerous building operations and the like, that were continually going on, exposed sections that would not otherwise be available, and that frequently contained objects of much geological importance. The Local Society was often the only knowledgeable body that was in a position to keep an eye upon what was going on, and it was up to its members to record any finds that were likely to be of interest.

This was followed by papers by Dr. F. A. Bather, F.R.S., and Mr. Norman Parley on "Durability of Paper for Scientific Publications," the purport of which appeared to be that papers known as Grades 1 and 2, recommended by the Library Association, were safe papers for the purpose. This led to a long and interesting discussion in which we had the benefit of the experience of, among others, the printer and the paper-maker. We were shown a specimen of newsprint that had been exposed to the sun for a few hours and which simply fell to pieces when touched; of a book nearly a hundred years old, the paper of the title page of which was made of straw and yet was as sound and tough as the day it was made; old esparto papers in perfect condition, together with many others, all of which were shown to be suitable, and in the end the conclusion arrived at was that the material of which the paper was made was of far less importance than the treatment that it received in the course of manufacture. Papers used for plates also came in for attention; it was pointed out that for the finely screened half-tone

plates, so much in use at the present time, an absolutely smooth faced paper was imperative, but that it need not on that account be one that would easily perish. Many of the so-called art papers were made by attaching a smooth "surface" to a poor-quality paper by some adhesive material and these, which were but poor imitations, would soon come to grief, and should therefore be avoided; but the true art paper, in which the smooth "surface" was an integral part of the paper, while giving all that was necessary for the effective production of the fine half-tone work, would be found to be quite durable.

At the Tuesday's meeting there was a discussion on "The Effects of Urban Expansion upon the Flora and Fauna of the Countryside." The first speaker was Mr. T. Sheppard of Hull, who, having dwelt upon the rapid expansion of buildings over some former country districts, gave a graphic account of coast erosion at one part and the banking up of other parts of the coast. He was followed by Sir John Russell, F.R.S., who referred to the great movement of the normally urban dweller to the country, and his mentality under the altered circumstances. The man who had always lived in the country was used to the things that he saw around him and he probably took little notice of them, but the town dweller coming to the country was placed in new, and to him, altogether different surroundings, which quite naturally forced themselves upon his attention. He had not the instincts of the country; he did things, possibly harmful things, that it would never have entered into the mind of the countryman to do, but he would in time no doubt fall into the ways of the countryman and become less of a menace to the countryside. Then Professor E. J. Salisbury dwelt chiefly on the preservation of wild flowers, but in no pessimistic vein, and thought we should do well not to use too many "don'ts" in our endeavours to educate the young people in the way they should go in regard to wild flowers. The discussion was continued by a number of other delegates whose chief ambition appeared to be to show the wonders that had been done by their own particular societies.

An innovation was the organisation by the Conference of a special excursion to "Down House" on the afternoon of Monday, the 28th, when a large number of delegates availed themselves of the opportunity to spend a few hours in the delightful surroundings where Charles Darwin spent so many years of his life.

Although my duty as your delegate ceases with my report of the proceedings at the Conference of Corresponding Societies, it is only right that I should add a few words on the meeting of the Association in general.

The Centenary Meeting was an unqualified success. Some five thousand members attended and the various buildings in the South Kensington block afforded ample accommodation for the numerous sectional meetings.

Naturally, Section D. (Zoology) claimed most of my attention and appropriately enough the Section was accommodated in one of the galleries of the Natural History Museum; the only fault in which was that the acoustic properties were not all that could be desired; but as the audiences seemed to take their subjects seriously, and were, therefore, less fidgety than is often the case, I think most of us were able to hear what was being said without much difficulty.

On Thursday the Proceedings were opened by the Sectional President, Professor E. B. Poulton, F.R.S., with an Address entitled, "One Hundred Years of Evolution," in which he surveyed in a masterly way the various suggestions that had been put forward during that period. He was followed by Professor J. S. Huxley, Mr. E. B. Ford, Dr. F. A. Dixey and Professor H. Fairfield Osborn, with papers all bearing on the evolution question.

Friday morning was devoted to a discussion on Vertebrate Embryology opened by Professor E. W. MacBride, F.R.S., and continued by Mr. J. H. Woodger, Mr. C. H. Waddington, Professor J. Graham Kerr, F.R.S., and Mr. G. L. Purser, a great deal of recent, very intricate work being passed under review by the speakers in their endeavours to establish their own particular views on the subject.

Saturday morning was completely occupied by a "Discussion on Population" which was opened by Professor J. S. Huxley; as was that of Monday by one on "Classification with reference to Phylogeny and Convergence" in which Dr. C. Tate Regan took the lead.

On Tuesday, under the title "Symposium on Variation and Genetics" we got back to the Evolution question. Professor J. W. Heslop-Harrison discoursed upon "Recent Work on Induced Mutations"; Dr. O. W. Richards on "Geographical Races and Evolution"; Dr. W. R. Thompson on "Biological races in relation to the Problem of Evolution"; Professor D. M. S. Watson, F.R.S., on "The Evolutionary Importance of the Study of Lineages," and Mr. J. B. S. Haldane on "The Genetical Analysis of Interspecific

Differences and the Mathematical Theory of Evolution." Needless to say the views of the various speakers were not all in complete accord, and it is to be regretted that the results of these discussions, however interesting they may be, are often not even mentioned in the Report of the Association.

At the concluding Session, on Wednesday morning, the first hour was devoted to a discussion on "The Past and Present of the Over-fishing Problem," and the remainder of the time was well filled by a "Symposium on Insects and Human Welfare." Dr. A. D. Imms, F.R.S., spoke on "Insect behaviour in relation to Control Measures," and Mr. J. C. F. Fryer on "Practical Achievements in Agricultural Entomology." Dr. C. B. Williams gave an account of the difficulties encountered in dealing with "The Trinidad Sugar Cane Froghopper and its Environment," and Dr. Ll. Lloyd dilated upon "The Passing of Insect-borne Diseases from Britain," which he considered was largely due to improved sanitary conditions. Finally Dr. P. A. Buxton dealt with "Studies in the Biology of Mosquitoes." The habits and ways of the mosquito have been so carefully studied during the past thirty years or more that we are inclined to think that we know all that there is to be known about them; but why should one pond be teeming with larvae while another, apparently similar in all respects, a mile away, has none? Dr. Buxton suggested possible reasons, but if we can make quite certain what the real reasons are, we may find that we have a weapon for the control of the mosquito more powerful than anything yet discovered.

There were few places of interest in and around London that could not be visited by members of the Association; many of them that are not available in the ordinary way—over one hundred and twenty separate excursions being arranged. Day after day, during the whole of the meeting, motor-buses and motor-coaches, extending the whole length of Imperial Institute Road, were filled to capacity by the members and set out to their various destinations.

Among the literature presented to Members were two little books that are well worth reading, namely, "The British Association—A Retrospect"—which is something more than a mere history of the Association's one hundred years of life; and "London and the Advancement of Science." Both these were written specially for this Meeting.

It is proposed to hold the 1932 Meeting in York, from August 31st to September 7th.

ROBERT ADKIN.

DECEMBER 10th, 1931.

The PRESIDENT in the Chair.

Messrs. B. J. MacNulty, of Wimbledon; R. W. Atwood, of Sydenham; and D. A. Nicholson, of Dulwich, were elected members.

Dr. Bull exhibited a short series of *Amathes lunosa*, varying much in depth of colour and marking, one example being dark chocolate with complete dark suffusion of hindwings. They were taken at light and sugar.

Mr. Downes exhibited young larvae of *Lasiocampa quercis* in their 3rd instar from ova laid by a very large female taken at Salcombe in August last; also larvae of *Triphaena janthina* from ova laid by a female taken at the Westerham field meeting in September last.

Miss L. Cheesman gave a lecture: "Two years collecting in the New Hebrides." A large number of excellent lantern slides were shown.

JANUARY 14th, 1932.

Mr. K. G. BLAIR, B.Sc., F.E.S., PRESIDENT, in the Chair.

The decease of Mr. W. J. Lucas was announced. He had been an active member of the Society since 1896.

Mr. F. J. Coulson exhibited the following species of Pterophorina to illustrate the paper read subsequently by Mr. Turner.

Emmelina monodactylus.—A series from Bournemouth, Clacton, Lowestoft, Mickleham, Ranmore, Wimbledon and other Surrey localities, with pupa cases and larva.

Stenoptilia pterodactyla.—A short series from Abbots Wood, Sussex, etc.

Marasmarcha lunaedactyla.—A short series from The Hill, Glynde, Sussex, and Leatherhead Downs, with pupa cases from *Ononis*.

Adkinia bipunctidactylus.—A short series bred from *Scabiosa succisa*, West Horsley, with pupa cases.

Porrittia galactodactyla.—A bred series from Hackhurst Downs and Boxhill, with pupa cases.

Platyptilia gonodactyla.—Showing preserved larva and pupa cases.

Alucita pentadactyla.—Showing pupa cases and ova. And individuals of other species.

Mr. C. N. Hawkins exhibited *Pyrameis atalanta*, L., ♀, bred

December 2nd, 1931, indoors, from a larva found on nettle at Leatherhead on 10.x.31; it has pale underside hindwings, and much blue scaling. *Brachionycha sphinx*, Hufn. (*cassinea*, Hb.), 2 ♂♂ bred November, 1931, from larvae beaten from *Ulmus montana* at the Field Meeting on 16.v.31. They are of two forms, 1 ochreous, 1 grey. *Ortholitha bipunctaria*, Schiff., a strongly marked ♂ netted at Box Hill on 15.viii.31.

Mr. Hy. J. Turner exhibited a portion of his collection of European species of "Plume" Moths with microscopic slides of larvae, pupae, venation, etc., diagrams and drawings of various larval, pupal and imaginal characters, and many admirable photographs kindly furnished by Mr. A. E. Tonge, to illustrate his paper entitled, "The Principles of the Classification of the British 'Plume Moths' (Pterophorina)." (See page 27.)

JANUARY 25th, 1932.

ANNUAL MEETING.

Mr. K. G. BLAIR, B.S.C., F.E.S., PRESIDENT, in the Chair.

The Report of the Treasurer and the Balance Sheet and the Report of the Council were presented, read, and adopted unanimously.

The following is a list of the Officers and Council for the year 1932-3 whose election was confirmed.

President.—T. H. L. Grosvenor, F.E.S.

Vice-Presidents.—K. G. Blair, B.Sc., F.E.S., and H. W. Andrews, F.E.S.

Hon. Treasurer.—A. E. Tonge, F.E.S.

Hon. Librarian.—E. E. Syms, F.E.S.

Hon. Curator.—S. R. Ashby, F.E.S.

Hon. Secretaries.—S. N. A. Jacobs, and Hy. J. Turner, F.E.S., F.R.H.S.

Hon. Lanternist.—J. H. Adkin.

Council.—G. V. Bull, B.A., M.B., F.E.S., F. J. Coulson, A. W. Dennis, T. R. Eagles, S. Edwards, F.L.S., F.Z.S., F.E.S., A. de B. Goodman, F.E.S., O. J. Janson, F.E.S., F. A. Labouchere, F.E.S., F. S. Smith, F.E.S., C. G. M. de Worms, F.E.S., M.B.O.U.

Mr. Blair (*President*) then gave a short account of the position and work of the Society and read obituaries of members who had died during the year. In place of his own Address he read the

account of the early history of the Society which had been prepared some time previously by the late Mr. E. Step (*President-designate*). (See p. 33.)

The new President, Mr. T. H. L. Grosvenor, then took the Chair.

Votes of Thanks were passed to the retiring President, Officers, Council and Auditors for their services during the past year.

ORDINARY MEETING.

Mr. T. H. L. GROSVENOR, F.E.S., PRESIDENT, in the Chair.

Mr. Robert Adkin and Mr. Stanley Edwards were unanimously elected Honorary Members of the Society for their long and eminent services during so many years. Mr. W. L. Rudland of was elected a member.

Mr. C. N. Hawkins exhibited a long and varied series of *Hybernia defoliaria* taken in Epping Forest in November last.

Mr. Hy. J. Turner exhibited examples of the Papilionid *Sericinus telamon* from Central China, a tailed species very closely allied to the Mediterranean genus *Zerynthia*.

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~~1932-1933~~

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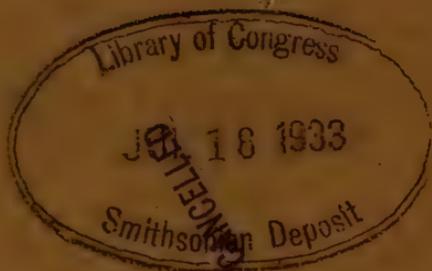
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Chief subjects of Study :—*h*, Hymenoptera ; *o*, Orthoptera ; *he*, Hemiptera ; *n*, Neuroptera ; *p*, Paraneuroptera ; *c*, Coleoptera ; *d*, Diptera ; *l*, Lepidoptera ; *ool*, Oology ; *orn*, Ornithology ; *r*, Reptilia ; *m*, Mollusca ; *cr*, Crustacea ; *b*, Botany ; *mi*, Microscopy ; *ec. ent.*, Economic Entomology ; *e*, signifies Exotic forms ; *trich*, Trichoptera.



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- 1886 ADKIN, B. W., F.E.S., "Highfield," Pembury, Tunbridge Wells. *l, orn.*
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- 1901 ADKIN, R. A., 1, Hartfield Court, Eastbourne. *m.*
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- 1928 ANDERSON, C. D., 22, Mount Park Road, Ealing, W.5.
- 1907 ANDREWS, H. W., F.E.S., *Council*, "Woodside," 6, Footscray Road, Eltham, S.E. 9. *d.*
- 1901 ARMSTRONG, Capt. R. R., B.A., B.C. (Cantab), F.R.C.S., F.R.C.P., F.E.S., 65, Lee Road, Blackheath, S.E.3. *e, l.*
- 1895 ASHBY, S. R., F.E.S., *Hon. Curator*, 37, Hide Road, Headstone, Harrow. *c, l.*
- 1931 ATTWOOD, R. W., 36, Tannsfild Road, Sydenham, S.E.26.
- 1930 AUBERTIN, Miss Daphne, F.E.S., British Museum (Nat. Hist.) Cromwell Road, S. Kensington, W.7.
- 1931 BALLARD, F., 40, Albert Road, Kingston-on-Thames.
- 1896 BARNETT, T. L., "The Lodge," Crohamhurst Place, Upper Selsdon Road, S. Croydon. *l.*
- 1887 BARREN, H. E., 78, Lyndhurst Road, Peckham, S.E. 15. *l.*
- 1927 BEDWELL, E. C., F.E.S., 54, Brighton Rd., Coulsdon, Surrey. *c.*
- 1929 BELL, J. K., F.E.S., Marden Lodge, Caterham Valley, Surrey.
- 1924 BIRD, Miss F. E., "Red Cottage," Cromwell Avenue, Billericay, Essex. *orn.*
- 1911 BLAIR, K. G., B.Sc., F.E.S., *Council*, "Claremont," 120, Sunningfields Road, Hendon, N.W. 4. *n, c.*

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ELECTION.

- 1898 BLISS, Capt., M. F., M.C., M.R.C.S., L.R.C.P., F.E.S., Butlin's Hill, Braunton, near Rugby. *l*.
- 1926 BLISS, A., 4, Monahan Avenue, Purley.
- 1925 BLYTH, S. F. P., "Cleveland," Chislehurst, Kent. *l*.
- 1923 BOUCK, Baron J. A., F.E.S., "Springfield," S. Godstone, Surrey. *l*.
- 1909 BOWMAN, R. T., "Rockbourne," Keswick Road, Orpington, Kent. *l*.
- 1909 BRIGHT, P. M., F.E.S., "Nether Court," 60, Christchurch Road, Bournemouth. *l*.
- 1927 BROCKLESBY, S. H., "Long Lodge," Merton Park, S.W.19. *l*.
- 1923 BROCKLEHURST, W. S., "Grove House," Bedford. *l*.
- 1924 BROOKE, Mrs. M. L., cf. Dr. C. O. S. Brooke, "Danesmere," Rosetta Avenue, Belfast. *l*.
- 1930 BROOKE, Miss W. M. A., cf. Dr. C. O. S. Brooke, "Danesmere," Rosetta Avenue, Belfast. *ec, ent, b*.
- 1927 BULL, G. V., B.A., M.B., *Council*, "White Gables," Sandhurst, Kent. *l*.
- 1915 BUNNETT, E. J., M.A., 72, Colfe Road, Forest Hill, S.E. 23. *ml*.
- 1922 BUSHBY, L. C., F.E.S., 11, Park Grove, Bromley, Kent. *c, het*.
- 1922 CANDLER, H., "Broad Eaves," Ashtead, Surrey. *l, orn, b*.
- 1899 CARR, Rev. F. M. B., M.A., L.TH., Ditton Vicarage, Widnes, Lancs. *l, n*.
- 1924 CHAPMAN, Miss L. M., "Arolla," Waterlow Road, Reigate.
- 1922 CHEESEMAN, C. J., 100, Dallinger Road, S.E. 12. *l*.
- 1879 CLODE, W. (*Life Member*.)
- 1915 COCKAYNE, E. A., A.M., D.M., F.R.C.P., F.E.S., 116, Westbourne Terrace, W. 2. *l*.
- 1932 COE, R. L., 40, Malden Hill Gardens, New Malden, Surrey. *di*.
- 1899 COLTHRUP, C. W., 68, Dovercourt Road, E. Dulwich, S.E. 22. *l, ool, orn*.
- 1928 COMMON, A. F., "Tessa," St. James Avenue, Thorpe Bay.
- 1907 COOTE, F. D., F.E.S., 32, Wickham Avenue, Cheam, Surrey. *l, b*.
- 1923 CORK, C. H., 11, Redesdale Street, Chelsea, S.W. 3. *l*.
- 1919 CORNISH, G. H., 141, Kirkham Street, Plumstead Common, S.E. 18. *l, c*.
- 1922 COUCHMAN, L. E., c/o Mrs. A. Couchman, May Cottage, Brooklane, Bromley, Kent. *l*.

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- 1909 COULSON, F. J., "Burnigill," 24, Springfield Road,
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- 1911 COXHEAD, G. W., 45, Leicester Road, Wanstead, E. 11.
(*Life Member.*) *c.*
- 1899 CRABTREE, B. H., F.E.S., "Holly Bank," Alderley Edge,
Cheshire. *l.*
- 1918 CRAFTURD, Clifford, "Dennys," Bishops Stortford. *l.*
- 1920 CROCKER, Capt. W., Constitutional Club, E. Bexley Heath.
l.
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S.W. 16. *l.*
- 1932 CROW, P. N., Orchard Cottage, Pinkney's Green, Maidenhead,
Berkshire. *l.*
- 1928 CURWEN, Capt. B. S., 9, Lebanon Pk., Twickenham. *l.*
- 1927 DANBY, G. C., 33, Huron Road, Tooting Common, S.W.17.
- 1925 DANNATT, W., "St. Lawrence," Gaibal Road, Burnt Ash,
Lee, S.E.12. *l.*
- 1900 DAY, F. H., F.E.S., 26, Currock Road, Carlisle. *l, c.*
- 1889 DENNIS, A. W., *Council*, 56, Romney Buildings, Millbank,
S.W.1. *l, mi, b.*
- 1930 DENVIL, H. G., 4, Warwick Road, Coulsdon, Surrey. *l.*
- 1918 DIXEY, F. A., M.A., M.D., F.R.S., F.E.S., Wadham College,
Oxford. (*Hon. Member.*)
- 1901 DODS, A. W., 88, Alkham Road, Stamford Hill, N. 16. *l.*
- 1921 DOLTON, H. L., 36, Chester Street, Oxford Road, Reading. *l.*
- 1930 DOWNES, J. A., 5, Trinity Road, Wimbledon, S.W.19. *l.*
- 1930 DUBBRIDGE, B. J., 13, Church Lane, Merton Park, S.W. 20.
- 1912 DUNSTER, L. E., 44, St. John's Wood Terrace, N.W.3.
l.
- 1927 EAGLES, T. R., *Vice-President*, 32, Abbey Road, Enfield,
Middlesex. *l.*
- 1928 EARLE, Edw., F.E.S., 16, Addison Gardens, W.14.
- 1886 EDWARDS, S., F.L.S., F.Z.S., F.E.S., *Council*, (*Hon. Member*),
Avenue House, The Avenue, Blackheath, S.E. 3. *l, el.*
- 1923 ELLIS, H. Willoughby, F.E.S., F.Z.S., M.B.O.U., Woodlands,
Old Hill, Chislehurst, Kent. *c, orn.*
- 1932 ENNIS, L. H., 16, Ernle Road, Wimbledon, S.W.20. *l.*
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- 1924 FASSNIDGE, Wm., M.A., F.E.S., 47, Tennyson Road, Portswood,
Southampton. *l, n, trich, he.*

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- 1930 FERRIER, W. J., 86, Portnalls Road, Coulsdon, Surrey. *l.*
- 1887 FLETCHER, W. H. B., M.A., F.E.S., Aldwick Manor, Bognor, Sussex. (*Life Member.*) *l.*
- 1926 FLETCHER, P. Bainbrigge, M.B.C., A.I.C., F.E.S., 65, Compton Road, Wimbledon, S.W.19. *c.*
- 1889 FORD, A., "South View," 42, Irving Road, West Southbourne, Bournemouth, Hants. *l, c.*
- 1920 FORD, L. T., "St. Michael's," Park Hill, Bexley, Kent. *l.*
- 1915 FOSTER, T. B., "Lenore," 1, Morland Avenue, Addiscombe, Croydon. *l.*
- 1907 FOUNTAINE, Miss M. E., F.E.S., "The Studio," 100A, Fellows Road, Hampstead, N.W.3. *l.*
- 1921 FRAMPTON, Rev. E. E., M.A., Halstead Rectory, Sevenoaks, Kent. *l.*
- 1886 FREMLIN, Major H. S., M.R.C.S., L.R.C.P., F.E.S., "Heavers," Ryarsh, Kent. *l.*
- 1919 FRISBY, G. E., F.E.S., 29, Darnley Road, Gravesend. *hym.*
- 1912 FROHAWK, F. W., M.B.O.U., F.E.S., "Essendene," Cavendish Road, Sutton, Surrey. *l, orn.*
- 1911 GAHAN, C. J., D.Sc., M.A., F.E.S., "The Mount," Aylsham, Norfolk. *c.*
- 1920 GAUNTLETT, H. L., M.R.C.S., L.R.C.P., F.E.S., 37, Howard Lane, Putney, S.W.15. *l.*
- 1927 GIBBINS, F. J. F.I.A.A., F.I.A.S., 51, Weldon Crescent, Harrow, Middlesex. *l.*
- 1928 GILLES, W. S., F.E.S., F.I.C., "The Cottage," Bocking, Braintree, Essex. *l.*
- 1930 GILLIATT, F. T., F.E.S., 25, Manor Road, Folkestone, Kent. *l.*
- 1929 GLEGG, D. L., F.E.S., "Vermala," 9, Westleigh Avenue, Putney, S.W.15. *l.*
- 1920 GOODMAN, A. de B., F.E.S., The Old Malt House, Shenley, Church End, nr. Bletchley, Bucks. *l.*
- 1926 GORDON, D. J., B.A., F.E.S., Craigellachie House, Strathpeffer, N.B. *col., lep.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend. *l.*
- 1925 GRAVES, P. P., F.E.S., 5, Hereford Square, S.W.7. *l.*
- 1918 GREEN, E. E., F.E.S., F.Z.S., "Ways End," Camberley, Surrey. *hem.*
- 1924 GREER, T., J.P., "Milton," Sandholes, Dungannon, Co. Tyrone. *l.*

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- 1926 GREY, Olive, Mrs., F.Z.S., 90, Charing Cross Road, W.C.2. *ent.*
- 1932 GRIFFIN, F. J., A.L.A., 41, Queen's Gate, S. Kensington, S.W.7.
ent.
- 1911 GROSVENOR, T. H. L., F.W.S., *Vice-President*, Springvale,
Linkfield Lane, Redhill. *l.*
- 1884 HALL, T. W., F.E.S., 61, West Smithfield, E.C. 1. *l.*
- 1926 HALTON, H. C. S., Essex Museum, West Ham, E.
- 1891 HAMM, A. H., A.L.S., F.E.S., 22, Southfields Road, Oxford. *l.*
- 1903 HARE, E. J., F.E.S., 4, New Square, Lincoln's Inn, W.C. 2. *l.*
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Gardens, W.8.
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- 1924 HARWOOD, P., F.E.S., Westminster Bank, 92, Wimborne Road,
Winton, Bournemouth. *l.*
- 1927 HAWGOOD, D. A., 2, Kingsmead Road, Tulse Hill, S.W.2. *l.*
- 1924 HAWKINS, C. N., F.E.S., *Council*, 23, Dalebury Road, Upper
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- 1929 HAWLEY, Lt.-Col. W. G. B., 13, Colville Road, W.11.
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- 1927 HEWER, H. R., M.Sc., D.I.C., Royal College of Science, S. Ken-
sington, S.W. 7.
- 1920 HODGSON, S. B., "St. Philips," Charles Street, Berkhamsted,
Herts.
- 1927 HOWARD, J. O. T., B.A., 78, St. John's Wood Court, N.W.8.
- 1931 HOWARTH, T. G., 77, Woodland Rise, Muswell Hill, N.10. *l.*
- 1927 HUGHES, A. W. McKenny, 22, Stanford Road, Kensington,
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- 1929 HUGHES, A. W., "Delamere," Buckingham Way, Wallington.
- 1928 JACKSON, F. W. J., "The Pines," Ashted, Surrey.
- 1914 JACKSON, W. H., "Pengama," 14, Woodcote Valley Road,
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- 1923 JACOBS, S. N. A., *Hon. Secretary*, Ditchling, Hayes Lane,
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- 1924 JAMES, A. R., 14, Golden Lane, E.C.1. *l.*
 1924 JAMES, R., F.E.S., 14, Golden Lane, E.C.1.
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 N.8. *ent.*
 1925 JARVIS, C., 12, Claylands Road, Clapham, S.W.8. *c.*
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 1928 KETTLEWELL, H. B. D., "Hovedene," 15, St. Augustine's Road,
 Edgbaston, Birmingham. *l.*
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 1924 LANGHAM, Sir Chas., Bart., F.E.S., Tempo Manor, Co. Fer-
 managh. *l.*
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 Sussex. *l.*
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 1919 LEMAN, G. C., F.E.S., "Wynyard," 52, West Hill, Putney
 Heath, S.W. 15. *c.*
 1933 LIPSCOMB, C. G., Lieut., Somerset Light Infantry, Blackdown,
 Surrey. *l.*
 1926 LONG, R. M., Witley, 3, Cedars Road, Beddington, Surrey. *l.*
 1932 LOUTH, C. S., "Silver Hill," Grosvenor Road, Caversham.
 1932 LOW, A. M., 6, Manor Gardens, Gunnersbury Pk., Acton.
 1925 MACCALLUM, C., 1, Aston Road, Ealing, W.5. *l.*
 1926 MACDONALD, F. W., 82, Trinity Street, Leytonstone, E.11. *l.*
 1931 MACNULTY, B. J., "Rutland," 67, All Saints Road, Sutton.
 1892 MAIN, H., B.Sc., F.E.S., F.Z.S., "Almondale," 55, Buckingham
 Road, S. Woodford, E. 18. *l, nat. phot., col.*
 1889 MANSBRIDGE, W., F.E.S., "Monreith," Derby Road, Formby,
 Liverpool. *l, c., etc.*
 1932 MARCON, Rev. J. W., 105, Endlebury Road, Chingford, E.4.

YEAR OF
ELECTION.

- 1930 MARSH, D. G., "Delville," Oxenden Square, Herne Bay. *l*.
- 1922 MASSEE, A. M., F.E.S., East Malling Research Station,
Kent. *l*.
- 1932 MELLOWS, W. T., M.B.E., LL.B., Scatton, Thorpe Road, Peter-
borough.
- 1889 MOORE, H., F.E.S., 12, Lower Road, Rotherhithe, S.E.16.
l, h, d, e l, e h, e d, mi.
- 1930 MORLEY, A. McD., 9, Radnor Park West, Folkestone.
- 1928 DE MORNEY, C. A. G., Flat 5, 60, Hogarth Road, Earls Court,
S.W.5.
- 1920 MORISON, G. D., F.E.S., Dept. Advisory Entomology, N. of
Scotland Agricultural College, Marichall, Aberdeen. *ec. ent*.
- 1929 NASH, J. A.,
- 1923 NASH, T. A. M., F.E.S., 16, Queen's Road, Richmond, Surrey. *l*.
- 1923 NASH, W. G., F.R.C.S., "Clavering House," de Pary's Avenue,
Bedford. *l*.
- 1906 NEWMAN, L. W., F.E.S., Salisbury Road, Bexley, Kent. *l*.
- 1926 NEWMAN, L. H., Salisbury Road, Bexley, Kent. *l*.
- 1930 NIBLETT, M., *Council*, 10, Greenway, Wallington, Surrey. *l*.
- 1931 NICHOLSON, D. A., 11, Birkbeck Road, Dulwich, S.E.21.
- 1926 NIXON, G. E., B.A., 315B, Norwood Road, Herne Hill, S.E.24. *h, l*.
- 1932 O'FARRELL, A. F., 20, Crescent Road, Wimbledon, S.W.19.
- 1911 PAGE, H. E., F.E.S., "Bertrose," 17, Gellatly Road, New
Cross, S.E.14. *l*.
- 1927 PALMER, D. S., "North Lodge," Esher.
- 1930 PEARMAN, Capt. A., Elm Cottage, Purley, Surrey. *l*.
- 1908 PENNINGTON, F., Oxford Mansions, Oxford Circus, W. 1. *l*.
- 1928 PERKINS, J. F., F.E.S., 19, Courtfield Gardens, S.W.5. *h*.
- 1933 PEYTON, A. G., Holly Bank, Napleton Road, Ramsgate. *l*.
- 1925 PORTSMOUTH, J., 15, Victoria Street, Westminster, S.W.1. *l*.
- 1925 PORTSMOUTH, G. B., 15, Victoria Street, Westminster, S.W.1. *l*.
- 1912 POULTON, PROF. E. B., D.SC., M.A., F.R.S., F.L.S., F.G.S.,
F.Z.S., F.E.S., "Wykeham House," Oxford. (*Hon. Member.*)
- 1927 PRATT, W. B., 10, Lion Gate Gardens, Richmond Lane.
- 1897 PREST, E. E. B., 8 and 9, Chiswell Street, E.C.1. *l*.
- 1924 PRIEST, C. G., 30, Princes Place, Notting Hill, W.11. *l*.
- 1904 PRISKE, R. A. R., F.E.S., 136, Coldershaw Road, W. Ealing,
W. 5. *l, m*.
- 1919 QUILTER, H. J., "Fir Cottage," Kiln Road, Prestwood, Great
Missenden. *l, c, d, mi*.

YEAR OF
ELECTION.

- 1922 RAIT-SMITH, W., F.Z.S., F.E.S., F.R.H.S., "Hurstleigh,"
Linkfield Lane, Redhill, Surrey. *l.*
- 1925 RALFS, MISS E. M., F.E.S., "Montpelier House," 60, Clarendon
Road, Holland Park, W.11.
- 1922 RATTRAY, Col. R. H., Halliford House, Newton Abbot, Devon.
l.
- 1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham
Common, S.W. 4. *orn.*
- 1927 RICHARDS, Percy R., "Wynford," 69, Upton Road, Bexley
Heath. *l.*
- 1920 RICHARDSON, A. W., F.E.S., 28, Avenue Road, Southall,
Middlesex. *l.*
- 1908 RILEY, Capt. N. D., F.E.S., F.Z.S., 7, McKay Road, Wimbledon,
S.W.20. *l.*
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pul-
borough, Sussex. *l.*
- 1922 ROBERTSON, W. J., M.R.C.S., L.R.C.P., F.Z.S., 69, Bedford Road,
S.W. 4. *l.*
- 1911 ROBINSON, Lady MAUD, F.E.S., Kirklington Hall, Newark.
l, n.
- 1920 ROTHSCHILD, THE RIGHT HON. LORD, D.SC., F.R.S., F.L.S., F.Z.S.,
F.E.S., Tring, Herts. *l, orn. (Life Member.)*
- 1887 ROUTLEDGE, G. B., F.E.S., "Tarn Lodge," Heads Nook, Carlisle.
l, c.
- 1890 ROWNTREE, J. H., "Scalby Nabs," Scarborough, Yorks. *l.*
- 1932 RUDLAND, W. L., 211, Caversham Road, Reading.
- 1932 RUSSELL, A. G. B., M.V.O., Scarbank House, Swanage, Dorset. *l.*
- 1915 RUSSELL, S. G. C., "Brockenhurst," Reading Road, Fleet,
Hants. *l.*
- 1908 ST. AUBYN, Capt. J. A., F.E.S., 14, Purley Knoll, Purley.
- 1914 SCHMASSMANN, W., F.E.S., "Beulah Lodge," London Road,
Enfield, N. *l.*
- 1910 SCORER, A. G., "Hillcrest," Chilworth, Guildford. *l.*
- 1927 SCOTT, E., M.B., "Hayesbank," Ashford, Kent. *l.*
- 1923 SEVASTOPULO, D. G., F.E.S., c/o Ralli Bros. Ltd., Calcutta. *l.*
- 1910 SHELDON, W. G., F.Z.S., F.E.S., "West Watch," Oxted,
Surrey. *l.*
- 1898 SICH, ALF., F.E.S., "Grayingham," Farncombe Road,
Worthing. *l.*
- 1925 SIMMONS, A., 42, Loughboro Road, W. Bridgford, Nottingham. *l.*
- 1927 SKELTON, Hy. E., 12, Mandrake Road, Upper Tooting,
S.W. 17.

YEAR OF
ELECTION.

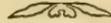
- 1921 SMART, Major, H. D., R.A.M.C., M.D., D.S.C., F.E.S., 172, High Road, Solway Hill, Woodford Green. *l.*
- 1908 SPERRING, C. W., 8, Eastcombe Avenue, Charlton, S.E. 7. *l.*
- 1927 STANLEY-SMITH, F. S., F.E.S., *Council*, "Alpha Cottage," Datchworth, Knebworth, Herts.
- 1928 STANLEY-SMITH, Mrs. Maud, *Council*, "Alpha Cottage," Datchworth, Knebworth, Herts.
- 1928 STOCKEN, H. E. W., Orchard Cottage, W. Byfleet, Surrey.
- 1924 STOREY, W. H., 7, Lansdowne Place, W.C.1. *ent.*
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 42, Chalkwell Avenue, Westcliff-on-Sea, Essex.
- 1932 STRINGER, A. H., 19, Exeter Road, Croydon. *c.*
- 1929 STUBBS, G. C., 41, St. Mary's Street, Ely, Cambs.
- 1916 SYMS, E. E., F.E.S., *Hon. Librarian*, 22, Woodlands Avenue, Wanstead, E.11. *l.*
- 1920 TALBOT, G., F.E.S., "Mon Plaisir," Wormley, Surrey. *l.*
- 1922 TAMS, W. H. T., F.E.S., 5, Daisy Lane, Hurlingham, S.W. 6. *l.*
- 1894 TARBAT, Rev. J. E., M.A., 1, Romsey Road, Winchester. *l, ool.*
- 1913 TATCHELL, L., F.E.S., Swanage, Dorset. *l.*
- 1925 TAYLOR, J. S., F.E.S., P.O. Box 513, Pretoria, Union of S.A. *l.*
- 1929 TETLEY, J., "White Cottage," Silverlea Gardens, Horley.
- 1931 THOMPSON, J. A., Tan-y-Bryn School, St. Margarets Drive, Llandudno, N. Wales. *l.*
- 1933 THORPE, R. A., 49, Sydenham Hill, S. E.26.
- 1926 TOMLINSON, Florence B., "The Anchorage," 51, Lodge Road, West Croydon. *l.*
- 1902 TONGE, A. E., F.E.S., *Hon. Treasurer*, "Aincroft," Grammar School Hill, Reigate. *l.*
- 1927 TOTTENHAM, Rev. C. E., F.E.S., The Rectory, Rous Lench, nr. Evesham, Thorpe Bay, Essex. *c.*
- 1887 TURNER, H. J., F.E.S., F.R.H.S., *Hon. Editor*, "Latemar," 25, West Drive, Cheam, Surrey. *l, c, n, he, b.*
- 1932 TURPIN, S. J., 1, Windcliffe Mansions, Letchmere Road, Willesden Green, N.W.2.
- 1921 VERNON, J. A., "Firlands," Ascot, Berks. *l.*
- 1923 VREDENBERG, G., 38, Ashworth Mansions, Maida Vale, W.9. *l.*
- 1889 WAINWRIGHT, C. J., F.E.S., 172, Hamstead Road, Handsworth, Birmingham. *l, d.*
- 1927 WAINWRIGHT, Chas., 29, Northfield Road, Kings Norton, Birmingham. *d.*

YEAR OF
ELECTION.

- 1929 WAINWRIGHT, J. Chas., 9, Priory Road, Hook Road, Surbiton, Surrey.
- 1929 WAINWRIGHT, John, 9, Priory Road, Hook Road, Surbiton, Surrey.
- 1911 WAKELY, L. D., 11, Crescent Road, Wimbledon, S.W.20. *l.*
- 1930 WAKELY, S., *Council*, 8, Woodland Hill, Upper Norwood, S.E.19.
- 1880 WALKER, Comm. J. J., M.A., F.L.S., F.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c.*
- 1927 WALKER, W. H., "Ranworth," Potters Bar. *l.*
- 1933 WALTER, F. G., c/o Dorking Brick Co., Ltd., N. Holmwood, Surrey. *l.*
- 1925 WARD, J. Davis, F.E.S., "Limehurst," Grange-over-Sands. *l.*
- 1920 WATSON, D., "Proctors," Southfleet, Kent. *l.*
- 1928 WATTS, W. J., 42, Bramerton Road, Beckenham. *c.*
- 1928 WELLS, Clifford, "Dial House," Crowthorne, Berks. *l.*
- 1911 WELLS, H. O., York Gate, Cheam Road, Ewell. *l.*
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.E.S., "Ellesmere," Gratwicke Road, Worthing. *l.*
- 1927 WHITE, A. G., "Hilltop," Chaldon, Surrey.
- 1930 WILKINS, C., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W.19.
- 1914 WILLIAMS, B. S., "St. Genny's," 15, Kingcroft Road, Harpenden. *l, c, hem.*
- 1912 WILLIAMS, C. B., M.A., F.E.S., Rothamsted Experimental Station, Harpendon. *l, ec. ent.*
- 1925 WILLIAMS, H. B., LL.D., F.E.S., "Red Mayes," 79, Broad Lane, Hampton-on-Thames, Middlesex. *l.*
- 1932 WILLIAMS, S. W. C., 4, Nelson Road, S. Chingford, E.4.
- 1932 WINDHAM, W. S., 40, Wellesley Road., Chiswick, W.4.
- 1927 WITTING, A. N., 6, Woolstone Road, Catford, S.E. 6.
- 1918 WOOD, H., "Albert Villa," Kennington, near Ashford, Kent. *l.*
- 1926 WOOTTON, W. J., F.R.H.S., Wannock Gardens, Polegate, Sussex. *l.*
- 1927 DE WORMS, C. G. M., M.A., F.E.S., M.B.O.U., F.C.S., F.I.C., *President*, Milton Pk., Egham, Surrey. *l, orn.*
- 1930 WORSFOLD, L. B., 24, Rectory Avenue, High Wycombe, Bucks.
- 1921 WORSLEY-WOOD, H., F.E.S., 37, De Freville Avenue, Cambridge. *l.*

Members will greatly oblige by informing the Hon. Sec. of any errors in, additions to, or alterations required in the above Addresses and descriptions.

REPORT OF THE COUNCIL FOR 1932.



The Council is pleased to be able, once more, to state that the past year has been well up to the standard of the Society, and that if anything, there is an advance in the work done and in the keenness of Members.

The Membership of the Society stands at 255 members, comprising 210 Ordinary Members, 37 Country Members, 4 Honorary Members, and 4 Life Members; there have been 16 New Members elected, and 4 Resignations. The Council regret to add that there have been 4 losses this year from death, Mr. R. South, Mr. J. J. Joicey, Mr. F. E. A. Colby and Dr. Randal Parkes.

The Treasurer has produced his Balance Sheet, duly audited, together with his statement of accounts, which show that the finances of the Society are still in a healthy condition. The Council would add, thanks to the unabated efforts of Mr. A. E. Tonge, and would point out to members that Mr. Tonge's task would be lightened considerably by the payment of Subscriptions without waiting for the Treasurer's application.

There have been 22 Ordinary Meetings, at which the average attendance was 45; the exhibits have been both numerous and interesting and the Council is pleased to note that, at last, the repeated requests for a full description of exhibits are bearing fruit, and many more exhibitors are giving to the Editor of Proceedings notes on the exhibits made instead of the bare names of the species shown. This all tends to add considerably to the interest and value of the volume of Proceedings and it is sincerely hoped that this is a practice which will continue to grow.

The Annual Exhibition was this year held on the second Thursday in October, instead of the fourth as has been the custom. The exhibits were varied and interesting as usual, and a very enjoyable evening was spent. An attendance of 193 Members and Visitors was recorded. The Society once more owes its thanks to Mr. T. H. L. Grosvenor for organising the Exhibition, and to Mr. A. de B. Goodman for making the necessary arrangements for refreshments and for the hire of tables and chairs.

There have been eleven papers and addresses read before the Society by Mr. H. B. Williams, LL.D., F.E.S., Mr. Hugh Main, B.Sc., F.E.S., Mr. A. E. Tonge, F.E.S., Mr. H. W. Andrews, F.E.S., Mr. L. W. Newman, F.E.S. (2), Mr. K. G. Blair, B.Sc., F.E.S., Mr. M. Niblett, Dr. H. R. Hewer, D.Sc., D.I.C., Dr. E. A. Cockayne, F.E.S., and Mr. C. N. Hawkins, F.E.S.

There have been nine Field Meetings, and with the exception of the first, all were eminently successful, thanks to the very fine weather which prevailed throughout the season. Many interesting captures were made, including some extremely local species, and the Council is most gratified to note that these meetings have been so much more fully reported at the meetings allotted for the purpose than has previously been the case; the attendance at Field Meetings seems to have improved, and at the majority of them workers in most orders were present. The Field Meetings were held at Effingham, Chilworth, Mickleham Down, Groombridge, Brentwood, Forest Row, Eynsford, Box Hill, and Westerham, and the thanks of the Society are due to those members whose work in making the necessary arrangements for these meetings has contributed so largely to their success.

The Lantern has been in use on six occasions, and the Society owes a vote of appreciation to Mr. J. H. Adkin for his services as Lanternist and to those members who have brought slides of such interest for exhibition at the Lantern Evenings.

The volume of Proceedings for 1931-32 consists of 116 + xx. pp. with two portraits and nine plates, and the Society is indebted to the Publication Committee in general, and to Mr. Robert Adkin in particular, for their help in the production of this volume.

Mr. Robert Adkin and Mr. Henry J. Turner again represented the Society at the Congress of the South Eastern Union of Scientific Societies held in June, and a report of this Congress has been furnished by Mr. Adkin, for which the Council again offers its thanks.

The Curator reports as follows:—

During the year the rearrangement of the Micro-Lepidoptera has been completed. Mr. H. Stringer of the Natural History Museum has very kindly undertaken to check the naming of species and generally revise these families of the Lepidoptera.

An application made to the authorities of the Natural History Museum for specimens to make the Society's collection of Micro-Lepidoptera more complete received their sympathetic consideration

and resulted in a handsome gift of specimens which has practically rendered complete the Society's collection of these families.

Members are reminded, however, that there are many gaps in the Society's collections of all orders, and that replacements in many cases are desirable.

Numerous other additions have been made by Members and others during the year ;

Mr. D. E. Kimmins : A pair of the Neuropteran *Borionymia rava*, Withyc.

Mr. Robert Adkin and Mr. H. L. Dolton : British Micro-Lepidoptera.

Mr. A. W. Dennis, Mr. A. de B. Goodman and Mr. S. N. A. Jacobs : British Macro-Lepidoptera.

Mr. T. H. L. Grosvenor : A drawer of Palaearctic *Zygaenidae*, and a pair of yellowish-pink British *Zygaena filipendulae*, L.

Mr. C. N. Hawkins and Dr. E. A. Cockayne : Blown Larvae of British Lepidoptera.

Lt.-Col. F. A. Labouchere : A series of *Chrysophanus dispar* race *batarus* from Wood Walton Fen, and Palaearctic butterflies from South France.

Mr. C. G. M. de Worms : British Lepidoptera selected from the collection of the late Dr. W. R. Parkes.

Mr. K. G. Blair : 150 species of British Coleoptera.

Mr. L. D. Wakely : Specimens of *Byctiscus betulae*, L., *Cathormiocerus socius*, Bh., and *Apion kiesewetteri*, L., from the Isle of Wight.

Dr. G. V. Bull, Mr. E. J. Bunnett and Mr. S. N. A. Jacobs : British Diptera.

Mr. E. Rivenhall Goffe of Southampton : Several species of *Tabanidae* not previously represented in the Society's Collection."

Your Council desires to express its appreciation of these gifts.

The Librarian reports as follows :—

Our Library continues to increase by purchase, exchange of our Proceedings, and by the gifts of our members. Some 209 volumes were borrowed, and more consulted at the meetings of the Society. The books most in demand are the back numbers of the three Entomological Journals, and the Standard Works on the various orders of insects.

Appended is a List of the Additions to the Library during the 1932-3 Session.

Books.—Nymphalidae of the Argentine (Captain K. J. Hayward) ; Butterflies of Columbia, Cephelopods of Wyoming, N. American

Gallinaceous Birds, Birds of Chili, Manchurian Fossils, Copepods of Mass., U.S.A. (from the Smithsonian Institute); British Dragonflies, Lucas (E. E. Syms); Bees, Wasps and Ants, E. Step (Mrs. Step); Diptera of Patagonia, 2 pts. (British Museum); Meyrick, British Lepidoptera, Revised ed. (W. Rait-Smith).

PROCEEDINGS, TRANSACTIONS, REPORTS OF SOCIETIES, ETC.—S. E. Naturalist and Antiquary; Bull. and Ann. Soc. ent de France; Ann. Report of the Smithsonian Institute; Ann. Report of the Conference of Delegates to the British Association (Mr. Adkin); Boll. R. Scuola d'Agricoltura Portici; Report of the U.S. National Museum; Journal Commons and Footpaths Preservation Soc.; London Nat.; Trans. and Proceed. of the S. of England Ent. Soc.; Proc. Croydon N. H. Soc.; Rep. Hastings and E. Sussex N. H. Soc.; Perthshire Science Soc.; Rep. Imp. Institute Pusa; Proceed. Bournemouth N. Science Soc.; Phenological Report (Meteorological Soc.); Trans. Leicester Science Soc.; Stylops Nos. 1-12 (Rev. A. Thornley); Trans. Wisconsin Acad. of Science.

PERIODICALS AND MAGAZINES.—Entomologist; Ent. Mo. Mag.; Ent. Record and Jr. of Var.; Canadian Ent.; Phil. Jr. of Science; Ent. News; Repertorium; Natural History; Vasculum; Revue Russe d'Ent.; Revista Ent. Soc. Argentina; Essex Nat.; Bird Lovers Monthly (1 no.); Proc. I. of Wight N. H. Soc.; Horae Soc. Ent. Rossicae (Thian Shanski).

SEPARATA.—American Smithsonian Institute; Chicago Field Museum; Lloyd Library; Capt. Hayward (Argentine); J. Sneyd Taylor; Additions to the Lepidopterous Fauna of Sussex (R. Adkin); Studies in Zygaenids (Dr. Hewer); Studies in Colour changes in Flat-fish (Dr. Hewer); Russian Ent. Soc.; List of Butterflies and Moths of Folkestone (A. M. Morley); Annual Address to the Entomological Society of London, Dr. Eltringham.

TREASURER'S REPORT, 1932.

After the remarks I made in my last report as to the advantage of sending out 3 reminders for subscriptions due, it is exceedingly disappointing to see such a very large falling off in the past year, when owing to pressure of work I was only able to send out two.

To find current subscriptions paid, dropping from £103 7s. 6d. in 1931 to £68 15s. 1932, is not calculated to make an honorary official think that he is getting the help and consideration from his fellow members which he is entitled to expect, and I hope that 1933 will show very much better figures.

However, there are bright spots in my accounts as well as dark ones and I am truly glad to be able to report that the value of our assets has increased very considerably. You will remember that last year owing to the serious fall in values I priced your investments at current quotations and entered them in my accounts at a total value of £637 12s. 6d. showing a loss of £29 on the purchase price. We have since then bought a further £100 worth of $3\frac{1}{2}\%$ Conversion Loan which must be borne in mind, but even allowing for this our investments at to-days prices show an advance of over £100 in value and stand at the very satisfactory figure of £846 10s. 5d.

Continuing my review of the 1932 figures arrears of subscriptions paid produced only £8 this year instead of the £10 estimated, while subscriptions paid in advance were up to the usual mark.

Dividends were as usual but deposit interest is less as the money on deposit was withdrawn to purchase Conversion Loan.

Entrance fees were double last years figures and will I hope go on increasing.

The tea fund produced very nearly the same figures as last year £14 16s. 2d. compared with £14 14s. 6d. This is roughly 3 guineas short of the cost of refreshments at our annual exhibition.

Donations to the Publication Fund have been on a most liberal scale, all the $\frac{1}{2}$ -tone blocks in the 1932 volume of the Proceedings having been presented to the Society, chiefly through the generosity and kindness of a member who has frequently helped us before in this and other ways.

[continued on p. xx.]

PUBLICATION FUND.

| | | | | | | | |
|----------------------------|------|----|-------------|---------------------------------|------------|-----------|----------|
| To Printing Proceedings .. | £ 77 | 18 | 0 | By Balance brought from 1931 .. | £ 3 | 5 | 3 |
| " Half-tone Blocks .. | 24 | 2 | 6 | " Donations .. | 26 | 17 | 6 |
| " Reproduction fee .. | 10 | 6 | | " Interest on Chapman legacy .. | 15 | 0 | 0 |
| | | | 102 | " Bonus on ditto .. | 3 | 0 | 0 |
| " Balance carried down .. | .. | 2 | 7 | " Grant from General Fund.. | 54 | 0 | 0 |
| | | | | " Sales of Proceedings .. | 2 | 15 | 10 |
| | | | <u>£104</u> | | <u>104</u> | <u>18</u> | <u>7</u> |

ENTRANCE FEES AND LIFE-MEMBERSHIP SUBSCRIPTIONS ACCOUNT.

| | | | | | | | |
|----------------------------------|-------|---|-------------|---|------------|----------|----------|
| To 3½% Conversion Loan bought .. | £ 100 | 0 | 0 | By balance brought forward from 1931 .. | £ 64 | 11 | 6 |
| " Balance carried down .. | .. | 3 | 9 | " Legacy from the late Major C. E. Liles less tax | 6 | 15 | 0 |
| | | | | " Entrance fees transferred from General a/c .. | 2 | 2 | 6 |
| | | | <u>£103</u> | " Grant from General Fund.. | 30 | 0 | 0 |
| | | | | | <u>103</u> | <u>9</u> | <u>0</u> |

BALANCE SHEET.

| | | | | | | | |
|--|-------|----|-------------|-----------------------------------|------------|-----------|----------|
| To Balance, being excess of assets over liabilities .. | £ 930 | 13 | 7 | By Balances— | | | |
| | | | | General Fund .. | 52 | 5 | 11 |
| | | | | Publication Fund .. | 2 | 7 | 7 |
| | | | | Library Fund .. | 1 | 0 | 8 |
| | | | | Suspense a/c .. | 3 | 9 | 0 |
| | | | | Investments at current quotations | 59 | 3 | 2 |
| | | | | 3½% War Stock (£300) at 98½ | 296 | 5 | 0 |
| | | | | 3½% Con. Loan (£391 15 3) at 99¼ | 385 | 0 | 0 |
| | | | | 4% Consols (£154 14s.) at 106½ | 165 | 5 | 5 |
| | | | | Subscriptions unpaid:— | 846 | 10 | 5 |
| | | | | Good .. | 20 | 0 | 0 |
| | | | | Doubtful, or bad .. | 20 | 0 | 0 |
| | | | | say | | | |
| | | | <u>£930</u> | | <u>25</u> | <u>0</u> | <u>0</u> |
| | | | | | <u>930</u> | <u>13</u> | <u>7</u> |

Examined and found correct, this 24th January, 1933.

T. W. HALL,
H. W. ANDREWS, }
Auditors.

Sales of Proceedings are down by 12s. 4d. and Surplus Books to the value of £1 14s. 7d. were sold.

We also had a small additional payment on account of the legacy left us by our late member Major Liles amounting to £6 15s. 0d.

Turning now to the expenses, our usual fixed charges are much about the same, but printing cards and notices is down about £10 as no arrears of former years are included this time.

The printing of Proceedings was a very much more expensive business this time, the cost of printing and $\frac{1}{2}$ -tone blocks together being £102 11s. as against £77 10s. 2d. last year.

It is owing to the increased value of our investments as already indicated that I am again able to show an increase in the assets of the Society, but I am hoping to get in a lot of outstanding subscriptions and therefore estimate that arrears will produce at least £25 during the coming year instead of the usual £10.

This enables me to show a balance of £930 13s. 7d. as compared with £827 1s. 3d. last year.

I will now conclude by expressing my thanks to those members who have so kindly supported the Society by providing $\frac{1}{2}$ -tone blocks or contributing to the tea and publication funds, and also by thanking Messrs. T. W. Hall and H. W. Andrews who once again undertook the duty of auditing my accounts which they have checked as correct.

The details of the balance sheet and accounts are appended.

Notes on *Boarmia repandata* and *B. rhomboidaria*.

By HAROLD B. WILLIAMS, LL.D., F.E.S.—*Read March 10th, 1932.*

Some seven years ago, a friend of mine, an honoured member of this Society, paid me a visit at my cottage at Claygate and I showed him the rather beautiful eggs of *Boarmia rhomboidaria*. He seemed surprised, but some while later, looking at one of the three or four store boxes which then housed my collection of Geometrid Moths, remarked, "I see now why you are breeding these things."

Since then I have bred a goodly number of "these things," but I preface my paper with this little anecdote to direct your attention (perhaps unnecessarily, for it will soon be obvious to you) to the fact that I am a beginner in these matters. I have been greatly attracted to the Boarmiid Moths and have bred from the egg the six species to which South accustomed us to restrict the genus *Boarmia*. Prout has put wider ideas before us, and has included the species we were accustomed to find under *Cleora* and *Tephrosia*, indicating how the resulting mass might again be subdivided.

A problem results which it will be a joy to me to tackle some day. As yet I know far too little to attempt it, but I cannot refrain from observing that there is infinitely more logic in Prout's mass, and that I find it quite satisfying in the arrangement of our few British species. I cannot, indeed, subdivide his *Boarmia* as he suggests, or at all, unless I were to adopt the method of Tutt and have a genus for each species, except where I found a pair of closely related insects to share the generic title. Possibly such a system may be the right one, when one considers not only our insular fauna, but also the many Boarmiid species ranging, as they do, widely over the globe. Yet even in our limited number of British species, pairs closely related leap to the eye; *B. (Ectropis) crepuscularia* and *B. bistortata*; *B. roboraria* and *B. punctinalis*; *B. (Cleora) rhomboidaria* and *B. repandata*.

I have asked many questions of Nature about these creatures. Of many fascinating points in their life and variation, I shall hope to talk to you again. To-night I am to talk to you of the two last-mentioned species, and I shall invite you to help me understand the answers that Nature has given to my questionings. Let me then pass from classification to the living creatures themselves,

with the final comment that I cannot yet bring myself to accept Prout's action in placing *ribeata* (*abietaria*) between the two, though in deference to his wider knowledge, the species stands in my collection where he would wish it placed. Nevertheless, *ribeata* seems to me utterly different, and our two insects really are alike. Some of us perhaps don't know them well enough to know how like they are. Really to understand this likeness one needs to muddle up the larvae after seeing hundreds of each, as I have done; to have had *repandata* sent as *rhomboidaria* from the Isle of Man, and later, having pointed out the error, to receive the long awaited *rhomboidaria* masquerading as *repandata* from the same place; to find the long desired specimen of *rhomboidaria* from Northern Scotland in a series of *repandata* casually picked up at "Stevens'," and to realise that after all one had overlooked it oneself in looking over the collection. Then perhaps one can be schooled against surprise when a young friend whose skill in identification is a constant source of envy, persists in calling one's prettiest black forms of *rhomboidaria* by the name of the other species.

I will not detain you long over *repandata*. I know too little of this species. Moreover, the things I want you to have in mind are mostly very familiar to you. The species has long been popular with collectors, and its forms are fairly familiar, if their names are not.

Let us just glance first at the most striking of all, *ab.conversaria*, Hb. Prout, writing of this in Seitz (p. 370), says, "a beautiful form (or group of forms) with the median area black. The succeeding area is sometimes clear white." I do not possess the extreme form, though I have quite a range of different forms of *conversaria*, and of course very lovely insects have resulted from crossing it with *nigricata*, but I do want to emphasise Prout's suggestion that we have here a "group of forms." The New Forest *conversaria*, for example, are quite different from the Devonshire forms, though I have one from elsewhere in Hampshire that is not easily distinguishable from the Devon series. I have not bred this variety. When crossed with the plainer forms, it appears at times to link itself with sex in an abnormal way and I am prepared to learn that there is more than one factor, or a factor behaving differently in the presence of various other forms of the species, or of the factors associated with them. The insect which I have placed at the bottom of the second row of *conversaria* in my series may be looked at in the light of this very guarded suggestion, which I cannot support with any evidence, but which I want you to remember, when we come to look at some of the more obscure points in the genetics of *B. rhomboidaria*. We ought perhaps to remind ourselves in passing, that *deversata*, Std., a form similar to *conversaria*, is racial in part of the range of the species.

Then we have the northern forms—*destrigaria*, *muraria*, and *sodorensium*. I cannot deal with these under their names. You will find series labelled with some of them in my drawer, but I am not thereby asserting that the names are rightly applied. Let us get hold of the insects themselves, because if we know the locality we can be fairly sure of its form.

Look first at the Aberdeen race, one of the group of small forms. This is a most distinct race, but I do not yet know enough of its distribution to say much about it. It is very distinct with its pale ground colour, very distinct lines, and accentuated markings. One might be pardoned for thinking it a distinct species. We have, however, in the Isle of Man a somewhat darker, and generally larger, race, rather similar to the Perth race, but more distinctly marked as a rule. The distinct markings of these Manx insects recall the Aberdeen form very clearly, however, and they are, one supposes, much akin to one another.

In Belfast, there occurs a magnificent grey form, unlike any *repandata* I have seen from elsewhere. I regret I have only two, and that I failed to secure the very beautiful melanic form which is also quite different from *nigricata*. Clearly these Ulster specimens have no close relationship to their near neighbours in Scotland and the Isle of Man, and I shall hope to have the opportunity of learning more about them some day.

Of melanic forms, we have several. There is a dark form in Devon, very beautiful. There is a brownish black and rather ugly insect in Delamere, and in Birmingham, the London District and other large towns. There is *nigricata*, with its very minor modifications *nigropallida* and *ochronigra*, and there is a uniform smooth steely-black form, comparable to *ab. rebeli* of *rhomboïdaria*, but without the traces of marking usual in that variety.

These things want working out by careful breeding, which I see no prospect of being able to undertake, but the Scotch, Irish and Manx races, are perhaps most in need of careful investigation. I regret very much that I can tell you at present so little about them. I must of course add, common knowledge as it is, that in almost every locality for the species, it appears in a different form.

Let us now turn to *rhomboïdaria*. As I am not yet satisfied with my own knowledge of the named forms, I will refer to them rather briefly. First we may mention *minor*, Fuchs., a small second brood form, which I suppose may occur in any of the types of marking. I have it from Glasgow.

The common S. English light greyish form I take to be the type. Diverging from this, we have forms with a dark marginal area (which I have not seen), light forms, and dark forms. Of the first group there are *imbriaria*, Steph., described as an extraordinary aberration, with the ground colour very light yellow brown, scarcely dark-dusted, the entire distal area of both wings dark fuscous. *ab.*

millierata, Gmpbg., is a greyer, and less extreme, modification of this form.

The light ochreous form, common in South England, is *australaria*, Curtis.

Of the dark forms, *rebeli*, Aign., the jet black variety, is well known. It is itself very variable, some being almost uniformly steely black, others conspicuously marked with yellow on the borders, and occasionally more extensively in the hindmarginal area, of the central band.

Then we have *perfumaria*, Newman. This is said to be almost entirely without the brown admixture, the violet ground colour often darkened. Prout says it is a local race in London, but that it is known as an aberration in France. I have these London insects, and you will see a row of what I conceive to be classical *perfumaria* from North Kent in one of my drawers. You will also find other forms ranged under the same label, many localities giving us dark grey races, quite constant in themselves, and breeding true, but quite distinct from the London one. I call your attention to the extremely fine "*perfumaria*-like" local forms from Glasgow, and from Mickleham of all places, and others, less striking, but still extreme, from Lancashire, Yorkshire, Gareloch-head, Forres and Aberdeen.

Turning again to the "type," we find the same story, and we have noted it in *repandata*. In almost every station for the species, we find a range of forms, breeding quite true when pure, and yet quite different from those of other stations. The "type" and "*perfumaria*" (using those expressions very loosely) occur side by side in some places, as at Oxshott, Claygate and Esher in Surrey, but one can pick out Oxshott "types" from Reading or Devonshire ones, London "*perfumaria*" from Glasgow or Lancashire ones, quite readily. *Rhomboidaria* has hosts of local forms, just as *repandata* has, and I avoid the expression "local race." I have never really grasped what it is supposed to mean, but I do at least feel sure that it means, or ought to mean, some conception more defined than these forms of *rhomboidaria*, though I am not sure Dr. Verity would not name some score or more of them. I, at any rate, am content to point out the fact that the very great variation which is to be found in *rhomboidaria* has a geographical, as well as what may, for want of a more accurate diagnosis, be called an individual basis. Beyond this, one has no right to go until the nature of these insects has been more clearly ascertained by breeding and inter-breeding, work which I hope, if I live long enough, to do.

Some little beginning on this work I have made, and I propose to-night to tell you something of what I have done in the last few years to try and obtain a closer understanding of the inter-relation of forms of the species. The chief result has been to produce what

you may regard as an excess of caution in some of the views I have put forward. At any rate, I have known for years of a completely new and very distinct form, and only now do I venture to describe and name it, because I can show, though I am as far as ever from understanding it, that it is not only quite distinct in appearance, but is also genetically distinct.

In Scotland, I think we may safely say that *rhomboïdaria* occurs in a dark range of forms. Very dark forms indeed occur in Glasgow. Interesting rather plain brownish forms occur at Forres, and quite a good "*perfumaria*" occurs in Ayrshire.

In 1926, my friend Mr. J. C. Haggart of Glasgow, to whom I am almost entirely indebted for my knowledge of Scottish *rhomboïdaria*, sent me a ♀ taken by his son on the Ayrshire coast. Worn as the specimen was, there was no possible doubt that here was something new. I have a habit of being very much of a nuisance to my friends when I need help, and I at once told Mr. Haggart that I wanted him to revisit the spot in 1927 and get me more specimens, and, above all, eggs. Mr. Haggart spent some time on the coast and in due course another ♀ with eggs reached me. The resulting larvae were carefully tended, but I had the exasperating experience of losing most of them. I remark in parenthesis that it is not easy to manage hibernating larvae from Scotland in the neighbourhood of London. However in 1928 I bred a few specimens, all ♂ ♂ and small.

At this time I was breeding the black ab. *rebeli* in some numbers. We have been led to believe that this form is recessive, and Mr. Newman is positive that he has bred it from 2 grey parents. These I think must have been "*perfumaria*" and the point is of considerable importance. At any rate, Mr. Newman sent me larvae in 1926 from a black ♀ of 1925, from which I bred *perfumaria* only. Pairing two of these, I bred in 1927, 40 ♂ ♂ and 53 ♀ ♀, all *perfumaria*.

Alternative explanations, bearing in mind Mr. Newman's report of his own experience, are:—

- (a) Pairing 1925. Black recessive ♀ × heterozygous dominant *perfumaria* ♂. My few larvae did not happen to include any of that half of the brood which produced black, and my one pairing did not happen to be of two heterozygotes (though there should have been no other greys [see b]).
- (b). Pairing 1925. Black recessive ♀ × homozygous dominant *perfumaria* ♂. Result in 1926 all heterozygous *perfumaria*. My pairing was of one of these with a homozygous dominant accidentally introduced.
- (c) Error in origin of larvae.
- (d) Similar error, coupled with previous error in observation.

In a previous paper, "Ent. Rec.," XLIII, 46-48, I have assumed the accuracy of observation of those who report the black ab. *rebeli* a recessive. My first attempt to confirm this gave a result in 1931, which has produced grave doubts in my mind. Of this, more later.

In 1928 I had a strain of *rebeli*, which for our present purpose must be regarded as a pure strain. *Rebeli* is a most vigorous insect and it occurred to me that if I paired one of Mr. Haggart's yellow ♂♂ with a ♀ *rebeli*, I should get a vigorous strain, and breed in 1929, a healthy brood of fine specimens of the new yellow form. I proceeded to carry out this experiment and the larvae prospered.

On June 29th, 1929, the first moths appeared, both ♂♂ and both black. This was a shock. My good friend Dr. Cockayne cast doubts on the parentage, and did so with more assurance as further black specimens emerged, until the entire brood had emerged, being 35 ♂♂ and 27 ♀♀, 62 in all, all black.

I felt quite sure there was no error; indeed I had the evidence of my eyes, and I paired some of these F.1. blacks. Also on July 11th, 1929 a grey type ♂ (wild Esher form) flew into my room and was paired with a black ♀. This time I was able to note in my diary the segregation of the two moths and also the further fact, "There has been no black ♂ alive in my possession since the ♀ emerged."

I want just to mention here that all my sleeves are carefully labelled, and that throughout these experiments any larva found in a sleeve once emptied has been turned loose in the garden at once, and that in the only case of a lost label the entire brood was at once sacrificed in this way. I am thus absolutely sure of the pedigree of every insect noted in my records. I have prepared a pictorial pedigree to make the further results easier to follow.

For moths emerging in 1930, we are concerned with three broods, two pairings of F.1. blacks inter se, and one pairing of F.1. black ♀ with wild grey ♂. I think it exceedingly fortunate that that wild grey ♂ arrived when it did, as it saved me from one possible error.

The ordinary F.2. broods held, I supposed, two possibilities; either the progeny would be all black, proving some error in 1928, or they would be 75% black and 25% of the new form, proving black to be dominant to this form and not recessive, as I had been led to expect from its reported behaviour with "*perfumaria*." The crossing with the wild grey form I rather expected to produce all greys.

Not one of my predictions was fulfilled.

Let us dispose of the crossing with the wild grey ♂ first. This brood produced

| | |
|----------|-----------|
| Grey ♂ 9 | Black ♂ 8 |
| Grey ♀ 5 | Black ♀ 7 |
| — | — |
| 14 | 15 |
| — | — |

This is as near 50% of each form as one can get without being exactly there. The result suggests the crossing of a heterozygous dominant (the black ♀) with a pure RECESSIVE (the grey ♂) and so far as I know is consistent only with such a parentage. But although I had already, when I made the crossing, a conviction that the black ♀ parent was indeed a heterozygous dominant, and this conviction has since proceeded to proof, the ♀ parent was not heterozygous so far as I could see for "grey" at all; only for what I will call "yellow" and "black." This little difficulty can be got over in two ways; by assuming (a) that "grey" and "yellow" are identical, or (b) that "grey," recessive to black, is dominant to yellow.

The risk that (a) might be true, has delayed my describing the yellow form before. It was just possible it might, although so distinct in marking, be no more distinct from the Esher "grey" form in essentials, than is any one of the modifications of the grey type to which I have called your attention.

The other two broods reared in 1930 throw a little more light on the matter. Let me set them out in tabular form, remarking that a temporary failure of the human element prevents me being quite sure of the relative numbers of greys and yellows in the large brood.

Here are the results:—

| | | | |
|----|-------------|----------------------------------|--------------|
| A. | 17 Light ♂ | ALL GREY | 61 Black ♂ |
| | 17 Light ♀ | (of which 5 or 6 were YELLOW) | 68 Black ♀ |
| | — | | — |
| | 34 = 20·85% | | 129 = 79·15% |
| | — | | — |
| B. | No Grey ♂ | No Yellow ♂ | 2 Black ♂ |
| | No Grey ♀ | 1 Yellow ♀ | 3 Black ♀ |
| | — | — | — |
| | 0 | 1 = 16·65% | 5 = 83·35% |
| | — | — | — |

Little help is derived from "B," but it is interesting that the only light moth was a yellow ♀ and that ALL the yellows in "A" were also ♀♀. I have seen no yellow ♂ alive since 1928.

For a long while, the emergences in brood "A" were 25% light, 75% black; then towards the end, the light forms failed and blacks continued to emerge. I have already remarked on the great vigour of the black stock and until something happens to convince me to the contrary, I shall assume that this greater vigour enables a rather higher proportion to survive and accounts for the divergence from the 25-75% proportion. I lost very few of Brood "A," but "B" did badly and the results are of no importance on proportions of light and

dark, except that they confirm to some slight extent my theory of the greater vigour of the black form.

What can be learnt from these 1930 F.2. specimens?

Of prime importance, of course, is the appearance of the grey form. It is very similar to the wild Esher form and many others, but where does it come from? That question I cannot answer. I cannot place it in the Ayrshire race, or in the black form from Kent.

Secondly, we have established that black is dominant to our yellow (+ grey we must add) Scottish stock, and thus we have confirmed the experiment suggesting black to be dominant to the Esher grey form.

Thirdly, and again bearing on that experiment, we have eliminated the possibility that "grey" and "yellow" are genetically identical, or we seem to have.

Fourthly, we have *not* established that "grey" is dominant to "yellow." The proportions are wrong. They can only be made to fit by a further assumption. In our 34 "Lights" in Brood "A" we have 5 or 6 "yellows" to 28 or 29 "greys." Our figures are 129 Black, 28/9 Grey, 5/6 Yellow, which do not fit any of the well-known ratios for combined characters, nor should they. We are reasonably near 3 : 1 proportion of Black and Light forms. The "Lights" inter se are about 6 : 1 but the males have not appeared. I cannot usefully pursue this, as I do not understand it, but I will content myself by saying that I must accept for the moment the relationship of black to light as a simple case of dominance. The relationship of black to grey may be epistatic, as also more probably that of grey to yellow, or these may be dominant and recessive to each other. There is also an apparent sex-linking of yellow, or, perhaps more probably some factor lethal to maleness in yellows may be present. All this is wild speculation. I have drawn many imaginary tables with little profit, save that I have come to see the importance of pairing extracted grey with extracted yellow.

I did not see this in 1930 and I carried on thus, all parents from the large brood (with one exception)

| | | | |
|----|--------------|------------------------------|--|
| A. | Black ♂ × ♀. | Bred <i>one</i> Black ♂. | 18.6.1931. |
| B. | " " | 2 Black ♂ 2 Black ♀ | 1 Grey ♂ 2 Grey ♀ |
| C. | " " | 28 Black ♂ 16 Black ♀ —44 | 5 Grey ♂ 4 Grey ♀ —9 1 Yellow ♀ —1 |

· Much about the same proportion as in 1930.

In 1930 I also had a brood of a "*perfumaria*" form from Ayrshire and I paired a ♂ with one of my F.2. black ♀ ♀.

Result 2 inky black ♀

1 "*perfumaria*" ♀.

Too few to tell me anything, but a tantalizing happening. My "*perfumaria*," not necessarily identical with Kent ones (though very like them), were certainly not heterozygous "dominants" carrying the factor for blackness. Blacks are not recorded for Ayrshire, and the original lot were very like the ♀ bred and very uniform. I can only begin to wonder about those *perfumaria* in Kent that are dominant to black. My result looks as though *perfumaria* in Scotland is recessive to black and higher than grey in an epistatic series. I expect to find that Mr. Newman is wrong in his recollection and that black is in fact dominant to "*perfumaria*" and that explanation (d) (ante) is the true solution of my *perfumaria* mystery.

If all goes well, I hope to breed in 1932 from a pairing of Grey ♂ × Yellow ♀, the parents from the same brood. At present I am no nearer understanding the genetics of these fascinating forms of *rhomboidaria* than I was five years ago. I have however, I think, established that my "Yellow," so distinct in facies, has a genetic constitution distinct from grey *rhomboidaria*—at least as distinct, it may be precisely as distinct, as the violet-grey *perfumaria*. I think then that it should now be described. Where in the scale of organisms inferior to a species it should be placed, I do not know. Turner calls *perfumaria* a "race." It is an odd one, to say the least. It may be an assemblage of many races. I am content to call my form an aberration, and as a slight tribute to my friend and helper Mr. J. C. Haggart of Glasgow, who introduced it to my knowledge, I wish it to bear his name.

Boarmia rhomboidaria ab. **haggarti** nov.*

Head, thorax, patagia, abdomen and wings of a smooth pale yellowish grey, the bands on the abdomen only faintly suggested. The smooth appearance of the wings, a conspicuous feature in both sexes, is due to the almost entire absence of the freckling of black scales, which gives a rougher and darker appearance to *rhomboidaria*. In fact, the yellowish grey ground colour of the wings, in spite of the pale appearance of the insect, is not paler than the whitish grey of typical *rhomboidaria*, the dark grey appearance of which is due to freckling, which is also a prominent feature in the bright ochreous aberration *australaria*, Curt.

On the pale ground, the usual markings are indicated, but in a paler shade than in other forms; the cross lines on the forewings quite weakly marked, the discoidal spot on the other hand being

* See Original Description in "Ent. Record" XLIV., 46 (1932).

very distinct and prominent and accentuated by a clear pale area below it; the subterminal line distinct, and the apical and sub-apical markings clear and conspicuous.

The hindwings particularly smooth, but the markings are indicated. The second cross line tends to be weak and is obsolescent in one ♀ specimen.

Size of B. rhomboidaria.

Types. ♂ and ♀ coll. mihi. ♂ bred 19.vii.1928. ♀ bred 29.vi.1930.

Co-types 3 ♂ ♂. 3 ♀ ♀ in coll. mihi.

2 other ♀ ♀ in coll. mihi.

1 ♀ in coll. Dr. E. A. Cockayne.

Other specimens in coll. J. C. Haggart.

Habitat. Largs, Ayrshire.

This aberration only occurs, so far as is at present known, at Largs, on the Ayrshire coast. The only specimens found at rest have been on walls, to which their colour assimilated well.



EXPLANATION OF PLATE I.

- 29. *Geometra vernaria* × 10.
- 30. *Acidalia* (*Ptychopoda*) *holosericata* × 20.
- 31. *Ephyra annulata* × 20.
- 32. *Odezia atrata* × 10.

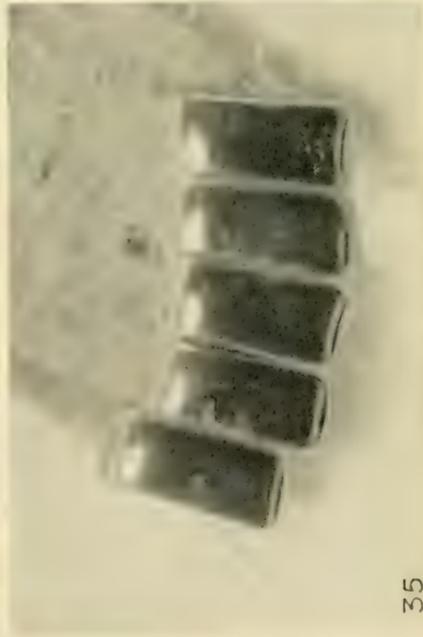
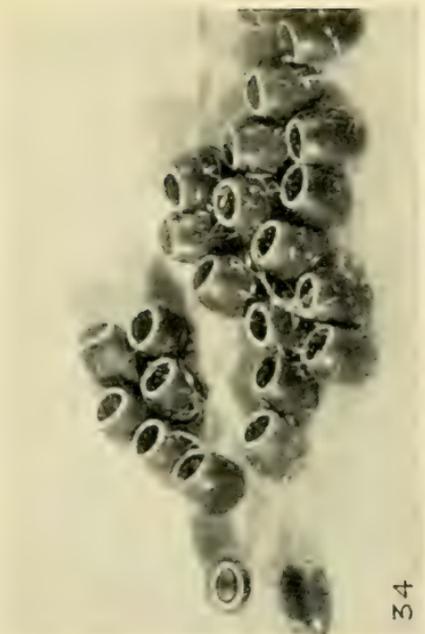
EXPLANATION OF PLATE II.

33. *Eupithecia assimilata* × 20.

34. *Ennomos autumnaria* × 10.

35. „ *fuscantaria* × 20.

36. *Ourapteryx sambucaria* × 20.



The Ova of British Lepidoptera.

Pt. III. Geometridae, etc.

(With Plates I.-IV.)

By A. E. TONGE, F.E.S.—Read April 14th, 1932.

In this paper I propose to deal with the *Geometridae* and the remaining small sub-families dealt with in the second volume of South's "British Moths" namely *Zygaenidae*, *Cochlididae*, *Cossidae*, *Sesiidae* and *Hepialidae*.

GEOMETRIDAE.

This is a large group of thin bodied and usually ample winged insects, which South, following Staudinger's lead, divides up as follows:—

| | | |
|----------------------|-----|----------|
| <i>Geometrinae</i> | 9 | Species. |
| <i>Acidaliinae</i> | 36 | „ |
| <i>Hydriomeninae</i> | 153 | „ |
| <i>Boarmiinae</i> | 81 | „ |

Their eggs vary considerably in colour and sculpture and are in the great majority of species flat and ovoid, but in the last named group, *Boarmiinae*, there are a few species which lay definitely upright eggs and a few others, which are doubtful, as the eggs appear to be laid both flat and upright according to circumstance, or convenience.

I should regard the typical Geometrid ovum as flat ovoid or lozenge shaped with a rather shiny shell and tapering slightly towards one end. The micropyle is usually at the thick end. White, pale yellow, or green when laid, and turning red, or purplish as it matures. Shell transparent and colourless and with a network of pits all over it. Usually laid singly on a leaf or twig, and when fertile, showing a considerable depression on the upper surface which increases as the embryo develops within. Not infrequently the pits are arranged in long straight rows running from end to end of the ovum.

This description would cover the vast majority of our British

species, variation being in the elongation or shortening of the ovoid shape, the flattening or filling out towards the spheroidal, and the large or small size and depth of the pits comprising the sculpture from a mere matte surface to a bold hexagonal network. Occasionally a Geometrid egg is particoloured, but as a rule it is unicolorous. Among the group known as "Thorn moths" there is rather more variation in shape. Some of them being inclined to squareness, or brick-shape, and others towards oval or flask-shape with the micropylar end squared off. When brick-shaped the eggs are usually laid in rows side by side, but the flask-shaped eggs seem to be dotted about promiscuously over the bark, or whatever they may be laid on, and are then difficult to determine as upright or flat.

GEOMETRINAE.

The first of South's Groups is quite a small one and comprises only 9 species divided into 7 genera most of them being "emeralds." The eggs of all of them are not dissimilar and none of the species stands out as markedly different from the rest. The eggs are typically Geometrid, all are of the flat type with transparent shell; ovoid rather tapered, and in the case of *pruinata* and *pustulata* somewhat flattened at the micropylar end. There is very little sculpture, but the surface of the shell is rough, or finely pitted, being smoothest in *viridata* and *strigata*, but the colour is variable from yellow and green to rosy pink.

The largest species as might be expected is *papilionaria*, which lays an egg over 1mm. in length, and the smallest *viridata*, which is rather less than half that size.

Perhaps the most noticeable feature is the curious habit in *vernaria* laying its eggs on the top of one another not unlike muffins in a baker's tray, a curious habit, which I have not met with in any other species.

Aplasta ononaria, .6mm., ovoid, fine pits, colour not noted.

Pseudoterpna pruinata, .7mm., ovoid and flattened, fine pits, pale dull pink.

Geometra papilionaria, 1.15mm., ovoid, fine pits, pale lemon clouded rosy.

G. vernaria, .75mm., ovoid, matte surface, pale green.

Euchloris pustulata, .75mm., ovoid and flattened, fine matte, apricot yellow.

E. smaragdaria, .75mm., ovoid, matte, pale lemon.

Nemoria viridata, .6mm., ovoid, smooth, pale green.

Iodis lactearia, .6mm., ovoid, flattened, finely pitted, pale olive green.

Hemithea strigata, .7mm., ovoid, smooth, dark greenish brown.

ACIDALIINAE.

This is a larger group of comparatively small and frail insects covering most of the "Waves" and the "Mochas." It comprises 36 species and 5 genera.

All are of the flat type with transparent shell.

The largest egg in the group is .75mm. long, and the smallest .5mm.

There is considerable difference in shape and sculpture, some being nearly spherical with bold pits all over, while others are very elongated and have deep furrows running from end to end lengthways; others again are nearly smooth.

In colour, too, there is quite a lot of difference, and a good many species, especially the "Ephyras," have two colours present, the ground being pale yellowish and carrying blotches or spots of red or brown.

Amongst the species (28) grouped under the genus *Acidalia* there are 4 species with short ovoid eggs, 11 species ovoid and 6 species long ovoid. The sculpture is distributed as follows, pitted all over 9 species, pitted or furrowed in long rows 12 species, 8 species are unicolorous and 12 species carry two colours, so that the grouping can hardly be said to be confirmed in any way by the style of ova laid.

Ephyra (6 species) is very consistent and all lay similar eggs, long ovoid in type, pitted strongly all over, and carrying two colours, if fertile, as they mature.

Hyria muricata, .56mm., ovoid, bold pits in long rows, beeswax brown.

Acidalia contiguaria, no example.

A. rusticata, .5mm., ovoid, bold pits in long rows, pale yellow to pinkish.

A. herbariata, no example.

A. virgularia, .5mm., ovoid, pitted moderately, yellow with orange red markings.

A. straminata, no example.

A. interjectaria, .5mm., ovoid, very bold pits.

A. humiliata, no example.

A. holosericata, .5mm., ovoid, very bold pits, honey yellow.

A. subsericeata, .5mm., ovoid, rows of very fine pits, pale yellow, clouded with darker shade.

A. degeneraria, .5mm., short ovoid, rows of pits, yellow to orange.

A. inornata, .55mm., short ovoid, moderate pits, pale reddish orange with darker clouds.

A. aversata, .5mm., short ovoid, bold pits, pale yellow tinged orange red.

A. bisetata,* .5mm., ovoid, bold pits, pale yellow with red markings.

* *biselata*.—Hy.J.T.

A. dimidiata, .5mm., ovoid, finely pitted, pale yellow clouded with reddish.

A. trigeminata, .5mm., ovoid, bold pits, yellow with orange red markings.

A. ornata, .65mm., ovoid, moderate pits, pale yellow with pale red markings.

A. remutaria, .7mm., long ovoid, long deep furrows, pinkish yellow, markings dark red.

A. immutata, .6mm., long ovoid, long deep furrows, pale green, markings red.

A. marginepunctata, .75mm., long ovoid, long rows of pits, yellow to rosy red.

A. immorata, .65mm., long ovoid, long bold furrows, pale green.

A. strigilaria, no example.

A. emutaria, .5mm., short ovoid, bold pits, red to purple.

A. imitaria, .75mm., long ovoid, long bold ribs, yellow with red markings.

A. rubiginata, no example.

A. fumata, .7mm., long ovoid, long bold ribs, greenish yellow, markings red.

A. ochrata, .5mm., ovoid, bold long ribs, white.

A. perochraria, no example.

Ania emarginata, .55mm., short ovoid, bold pits, golden yellow.

Timandra amata, .7mm., long ovoid, shallow pits, palest green to red.

Ephyra porata, .65mm., long ovoid, bold pits, pearly white tinged yellow.

E. punctaria, .65mm., long ovoid, bold pits, pearly white dark red markings.

E. linearia, .75mm., long ovoid, bold pits, pale greenish with red markings.

E. annulata, .6mm., long ovoid, bold pits, palest yellow with red markings.

E. orbicularia, .75mm., long ovoid, bold pits, palest yellow with orange red markings.

E. pendularia, .7mm., long ovoid, bold pits, palest pink with rosy red markings.

HYDRIOMENINAE.

This very large group of 153 species, divided into 45 genera, naturally includes many forms of ovum, but so far as I am aware, all are flat eggs and none upright. 41 species, most of them in the *Eupithecia* group, still remain undescribed for want of material.* The largest egg in the whole group is 1mm. in length and the

* A few of these have been described since the paper was read.—A.E.T.

smallest .5mm. 21 species are short ovoid in shape, of which two have one end flattened. 59 species are ovoid, of which 8 have the micropylar end squared off. 14 species are long ovoid in shape and 3 of these are squared off at one end. 18 species are noticeably tapered, the micropylar end being thickest.

The most curious egg in the group is that of *O. atrata* which is shaped like a cowrie shell with a longitudinal fold down the middle.

Only 8 of the species examined show spots or blotches of a different colour to the ground, 26 species have a matte or nearly smooth surface to the eggshell. 52 are pitted, or reticulated, with shallow depressions. 28 have bold pits, or hexagonal network, and 3 have long ribs or furrows.

The group *Eupithecia* comprising 42 species, of which only 21 have so far been examined, is remarkably free from variation, 17 being ovoid in shape, 19 pitted all over, and 14 yellow in colour. The longest is .8mm. and the shortest .5mm. None are parti-coloured. Two other species usually included in the "Pugs," namely *pumilata* and *coronata*, are ovoid, smooth and yellow, so that the eggs do not support their separation from *Eupithecia* excepting in the one direction of a smooth shell, which is also present in *tenuiata* and *inturbata*.

Sterrha sacraria, .8mm., long ovoid, shiny, long furrows, greenish yellow.

Ortholitha plumbaria, .65mm., ovoid, shining, very bold pits, pale yellow.

O. cervinata, .7mm., ovoid, dull, matte, pale yellow.

O. limitata, .6mm., ovoid, smooth, no sculpture, pale yellow.

O. bipunctaria, .55mm., ovoid, shiny, no sculpture, pale yellow.

Mesotype virgata, .7mm., ovoid, one end flattened, dull, faintly pitted, orange.

Minoa murinata, no example.

Odezia atrata, .65mm., ovoid, cowrie shaped, dull, no sculpture, pale green.

Lithostege griseata, .65mm., ovoid, dull, faintly pitted, yellow.

Anaitis plagiata, .65mm., long ovoid, dull, faintly pitted, white.

A. efformata, no example.

Carsia paludata, .75mm., long ovoid, dull, faintly pitted, lemon yellow and waxy.

Chesias spartiata, .85mm., long ovoid, dull, faintly pitted, pale yellow with green cloud.

C. rufata, .6mm., long ovoid, dull, faintly pitted, pale yellow.

Lobophora polycommata, .6mm., ovoid, dull, pitted, reddish orange.

L. carpinata, .7mm., ovoid, smooth, pitted, bright orange red.

L. viretata, .75mm., long ovoid, one end flattened, dull, pitted, dark amber.

L. halterata, .7mm., ovoid, shiny, pitted, pale green.

- L. sexualisata*, no example.
- Cheimatobia brumata*, .65mm., long ovoid, shiny, bold pits, orange to rosy red.
- C. boreata*, .8mm., long ovoid, one end flattened, shining, bold network, pale green to orange.
- Triphosa dubitata*, .55mm., ovoid, shining, pitted, orange.
- Eucosmia certata*, .7mm., ovoid, shining, bold network, greenish white turning pale yellow.
- E. undulata*, .65mm., ovoid, shining, faint pits, pinkish brown.
- Scotosia retulata*, no example.
- S. rhamnata*, .65mm., long ovoid, shiny, hexagonal network, dark brown (mature).
- Eustroma silaceata*, .85mm., ovoid, tapered, shiny, pitted all over, yellowish white.
- Lygris reticulata*, .6mm., short ovoid, shiny, nearly smooth, white, transparent.
- L. prumata*, .75mm., ovoid, one end squared, dull, matte surface, pinky white with pale purple markings.
- L. testata*, .95mm., ovoid, one end squared, dull, matte, white with purple blotches.
- L. populata*, .95mm., long ovoid, dull, matte, pale orange pink marbled darker.
- L. associata*, .8mm., short ovoid, one end squared, dull, matte, pale pinkish brown.
- Cidaria pyraliata*, .8mm., short ovoid, one end squared, dull, matte, stone colour.
- C. fulrata*, .85mm., ovoid, one end squared, dull, matte, pale blue grey.
- C. corylata*, .65mm., short ovoid, shiny, large shallow pits, pale green, semi-transparent.
- C. truncata*, .85mm., ovoid, tapered, one end squared, shiny, shallow pits, waxy white.
- C. immanata*, .75mm., ovoid, tapered, one end squared, dull, very fine pits, golden brown.
- C. sagittata*, no example.
- C. siterata*, .6mm., ovoid, shiny, strong pits, pale greenish yellow.
- C. miata*, .65mm., ovoid, rather short, shiny, strongly pitted, white tinged green.
- Thera variata*, .75mm., ovoid, dull, finely pitted, pale lemon yellow.
- T. cognata (simulata)*, .75mm., ovoid, shiny, finely pitted, pale lemon.
- T. firmata*, 1mm., ovoid, shiny, pitted all over, pale green.
- T. juniperata*, .7mm., ovoid, shiny, pitted all over, bright green.
- Lampropteryx suffumata*, .8mm., ovoid, tapered, shiny, strongly pitted, pale yellow.
- Coremia quadrifasciaria*, .55mm., ovoid, tapered, shiny, shallow pitting, pale lemon.

- C. munitata*, no example.
C. unidentaria, .65mm., ovoid, shiny, strongly pitted, pale yellow.
C. ferrugata, .6mm., short ovoid, shiny, strongly pitted, golden yellow.
C. designata, .6mm., short ovoid, shiny, faintly pitted, yellow.
Amoeba olivata, no example.
A. viridaria, .65mm., ovoid, shiny, strongly pitted, rosy red.
Malenydris salicata, no example.
M. multistrigaria, .7mm., ovoid, shiny, very bold pits, rosy red.
M. didymata, .65mm., short ovoid, dull, matte, yellow with brown clouds.
Oporabia dilutata, .75mm., ovoid, shiny, shallow pits, rosy red.
O. autumnata, .75mm., ovoid, shiny, strong pits, bright red.
O. filigrammaria, .85mm., ovoid, shiny, shallow pits, bright red.
Venusia cambrica, no example.
Entephria caesiata, no example.
E. flavicinctata, .65mm., ovoid, shiny, shallow pits, pinkish orange.
Xanthorhoë montanata, .75mm., ovoid tapered, shiny, finely pitted, lemon yellow.
X. fluctuata, .6mm., ovoid tapered, shiny, hexagonal pits, pale yellow.
X. galiata, .65mm., ovoid, shiny, finely pitted, lemon yellow.
X. rivata, .65mm., short ovoid, shiny, matte surface, yellowish.
X. sociata, .65mm., short ovoid, dull, shallow pits, pale yellowish green.
X. tristata, .65mm., short ovoid, shiny, matte surface, colour not noted.
X. unangulata, .8mm., ovoid, shiny, finely pitted, yellow.
Euphyia picata, no example.
Entype hastata, .7mm., ovoid slightly tapering, shiny, finely pitted, white, transparent.
Mesolenca albicillata, .75mm., ovoid tapered to one end, shiny, very fine pits, pearly greenish.
M. ocellata, .65mm., ovoid, one end tapered, shiny, boldly pitted, yellow.
M. bicolorata, .75mm., ovoid, one end squared, dull, matte surface, waxy white, pink spot at micropyle.
Melanthia procellata, 1mm., ovoid, shiny, very finely pitted, rosy red.
Perizoma affinitata, .8mm., ovoid, shiny, finely pitted, pale orange.
P. alchemillata, .55mm., ovoid, shiny, faintly reticulated, pale yellow.
P. flavofasciata, .55mm., short ovoid, shiny, faintly reticulated, waxy yellow.
P. albulata, .5mm., short ovoid, shiny, matte, yellow.
P. bifasciata, no example.

P. minorata, no example.

P. blandiata, no example.

P. taeniata, .65mm., ovoid, shiny, finely reticulated, yellow.

Campptogramma bilineata, .5mm., short ovoid, shiny, very large pits, pale yellow.

Hydriomena furcata, .9mm., ovoid, one end squared, shiny, pitted finely more boldly at square end, orange.

H. impluviata, .6mm., ovoid, one end pointed, shiny, pitted all over, yellow.

H. ruberata, no example.

Anticlea cucullata, .65mm., ovoid tapered, shiny, pitted all over, pale orange.

A. badiata, .7mm., ovoid, tapered, shiny, hexagonal pits all over, orange.

A. berberata, .6mm., ovoid, tapered, shiny, hexagonal pits all over, palest yellow.

A. rubidata, .7mm., short ovoid, shiny, finely pitted, pale orange.

A. nigrofasciaria, .6mm., short ovoid, shiny, finely pitted, yellowish opalescent.

Euchoeca obliterated, .6mm., short ovoid, shiny, finely reticulated, pale yellow.

Asthenia candidata, .55mm., short ovoid, shiny, faintly reticulated, very pale green.

A. luteata, .75mm., long ovoid, one end squared, shiny, boldly ribbed, rosy red and darker markings.

A. testacea (sylvata), .6mm., ovoid, shiny, strongly pitted, whitish transparent.

A. blomeri, .55mm., long ovoid, shiny, finely pitted, pale yellow with red blotches.

Eupithecia oblongata, .55mm., ovoid, shiny, pitted all over, yellow.

E. pulchellata, .55mm., ovoid, shiny, pitted all over, green.

E. linariata, no example.

E. irriguata, .55mm., ovoid, shiny, pitted all over, red.

E. pusillata, no example.

E. indigata, no example.

E. insigniata, .6mm., ovoid, shiny, finely pitted, greenish white.

E. venosata, .6mm., ovoid, shiny, finely pitted, white.

E. pimpinellata, no example.

E. distinctaria, no example.

E. expallidata, .55mm., ovoid, shiny, pitted all over, bright yellow.

E. assimilata, .65mm., ovoid, shiny, pitted all over, white tinged with yellow.

F. absinthiata, no example.

F. goossensiata (minutata), no example.

F. denotata, .55mm., ovoid, shiny, reticulated, opalescent.

F. jasioniata, no example.

- E. albipunctata*, no example.
E. vulgata, .6mm., ovoid, shiny, finely pitted, pale lemon.
E. virgaureata, no example.
E. trisignaria, no example.
E. lariciata, .65mm., ovoid, shiny, pitted all over, orange brown.
E. castigata, .55mm., ovoid, pale green, smooth, shiny.
E. subnotata, .5mm., ovoid, shiny, coarsely pitted, brownish yellow.
E. extensaria, .7mm., ovoid, finely reticulated, yellow.
E. helveticaria, .65mm., ovoid, shiny, reticulated, golden yellow.
E. satyrata, .6mm., ovoid, shiny, reticulated, white with greenish tinge.
E. succenturiata, no example.
E. subfulvata, .6mm., ovoid, shiny, pitted all over, golden yellow.
E. scabiosata, .6mm., ovoid, shiny, pitted all over, pale yellow.
E. haworthiata, no example.
E. valerianata, .5mm., very ovoid, boldly pitted.
E. plumbeolata, no example.
E. pygmaea, .45mm., ovoid, long, finely pitted, pale yellow.
E. tenuiata, .6mm., long ovoid, shiny, smooth, orange red.
E. inturbata (subciliata), .55mm., ovoid, shiny, smooth, yellow to ruby red.
E. innotata, .75mm., ovoid, shiny, reticulated, yellow.
E. fraxinata, no example.
E. nanata, .8mm., long ovoid, shiny, reticulated, yellow.
E. abbreviata, .5mm., short ovoid, shiny, boldly pitted, pale orange.
E. dodoneata, no example.
E. exigua, no example.
E. sobrinata, .55mm., short ovoid, shiny, boldly pitted, yellow.
Gymnoscelis pumilata, .5mm., ovoid, shiny, smooth, bright yellow.
Eucymatoge togata, no example.
Chloroclystis coronata, .55mm., ovoid, shiny, smooth, pale yellow.
C. rectangulata, no example.
C. debiliata, no example.
Collix sparsata, no example.
Pelurga comitata, .55mm., short ovoid, dull, faintly reticulated, pale yellow.
Phibalapteryx lapidata, .7mm., ovoid tapered, dull, finely pitted, pale yellow.
P. polygrammata, no example.
P. vitalbata, .8mm., long ovoid tapered, dull, very finely reticulated, pale yellow.
P. tersata, .75mm., ovoid tapered, dull, finely pitted, pale waxy yellow.
Coenocalpe vittata, .65mm., ovoid tapered, dull, faint large pits, pale yellow.
Percnoptilota fluviata, .55mm., ovoid, shiny, shallow pits, pale yellow.

BOARMIDAE.

In this last group of the *Geometridae*, which includes 81 species divided into 47 genera, are to be found the greatest number of eggs differing in shape and marking from the typical *Geometrid*. I have been fortunate enough to have examined no less than 76 of the species and have found 4 of them to lay definitely upright eggs, while 4 others are doubtful. 1·1mm. would appear to be the longest egg in the group and there are 4 species of this length of which 1 *Himera pennaria* is upright, while *Semiothisa alternata* ·55mm., seems to be the shortest.

13 species are short ovoid in shape, and 1 nearly spherical; 36 are ovoid and 21 long ovoid, of which two are very long indeed, while 4 species are brick-shaped (3 *Ennomos* and 1 *Crocallis*). 9 species taper markedly towards one end, 10 are squared at one end and 3 are squared at both ends, while several, like *belgiaria*, are very flattened.

26 species are pitted all over the surface, 7 are boldly pitted, 24 are ribbed lengthways and 17 are smooth, or nearly so.

45 species are unicolorous, while 29 show two or more colours when mature. In *Ennomos* there are two very definitely distinct types of ovum. *Autumnaria* and *quercinaria* are short ovoid with one end squared and a pale ring around the micropylar area, while the other 3 species *alniaria*, *fuscantaria* and *erosaria* are brick-shaped, tapered and have one end squared. The two former are possibly upright, but the 3 latter are definitely flat and are laid side by side in regular rows like *elinguaria*.

The six species grouped under *Boarmia* show very little difference; all their eggs being green in colour, long ovoid in shape and decorated with long rows of pits usually very well marked in depth.

Abraxas sylvata, ·65mm., ovoid, shiny, boldly pitted, white.

A. grossulariata, ·9mm., ovoid, dull, finely pitted, greenish yellow.

Lomaspilis marginata, ·65mm., ovoid, one end tapered, dull, finely pitted, light green.

Ligdia adustata, ·7mm., ovoid, shiny, bold hexagonal pits, green turning rosy.

Aleucis pictaria, ·65mm., ovoid, dull, covered with scales and hairs, pinkish brown.

Bapta bimaculata, ·6mm., short ovoid, shiny, finely pitted, pearly white.

B. temerata, ·6mm., ovoid, shiny, finely pitted, greenish yellow.

Cabera pusaria, ·7mm., long ovoid, one end squared, shiny, fine long ridges, pale green.

C. exanthemata, ·75mm., long ovoid, one end squared, shiny, fine long ridges, yellow tinged red.

Numeria pulveraria, ·75mm., short ovoid, shiny, finely pitted, lemon yellow.



EXPLANATION OF PLATE III.

37. *Hemerophila* (*Synopsia*) *abruptaria* × 20.
38. *Boarmia* *gemmaria* × 20.
39. *Scoria* *lineata* × 20.
40. *Zygaena* *filipendulae* × 20.

EXPLANATION OF PLATE IV.

41. *Heterogena asella* × 20.
42. *Cossus cœsus* (*ligniperda*) × 10.
43. *Sesia andrenæformis* × 26.
44. *Hepialus humuli* × 20.



Photo: A. E. Tonge.

Ellopiia prosapiaria, .85mm., short ovoid, tapered, shiny, very fine pits, greenish yellow and waxy.

Metrocampa margaritaria, .6mm., short ovoid, dull, matte, yellowish white.

Ennomos autumnaria, upright?, .8mm., short ovoid, one end squared, dull, matte, dark coppery green, pale ring.

E. quercinaria, upright?, .8mm., short ovoid, one end squared, dull, matte, olive green with buff ring.

E. alniaria, 1mm., brick shaped, tapered, one end squared, dull, finely stippled, dark slatey green, pale ring.

E. fuscantaria, 1mm., brick shaped, one end squared, tapered, dull, finely stippled, dark green, lighter ring.

E. erosaria, .9mm., brick shaped, tapering, one end squared, dull, finely stippled, dark coppery, paler ring.

Selenia bilunaria, .9mm., short ovoid, shiny, finely pitted, reddish orange.

S. lunaria, .95mm., ovoid, shiny, finely pitted, orange.

S. tetralunaria, 1.1mm., ovoid, shiny, nearly smooth, dark red.

Hygrochroa syringaria, .75mm., ovoid, tapered, shiny, finely pitted, pale yellow.

Gonodontis bidentata, upright, .7mm., short ovoid, dull, matte, green.

Himera pennaria, upright, 1.1mm., ovoid, shiny, matte, olive green.

Crocallis elinguaris, 1.1mm., brick shaped, one end squared, dull, matte, dirty white marbled dark slatey brown.

Angerona prunaria, .8mm., short ovoid, shiny, finely pitted, green to red.

Ourapteryx sambucaria, upright, .9mm., short ovoid, one end flat, shiny, 13 long ribs, yellow.

Eurymene dolabraria, .7mm., ovoid tapered, shiny, matte, yellow.

Opisthograptis luteolata, .7mm., ovoid, shiny, finely pitted, yellowish white, clouded red.

Epione apiciaria, .95mm., long ovoid, shiny, finely reticulated, pale yellow, blotches red.

E. parallelaria, .9mm., short ovoid, shiny, finely reticulated, rose pink.

E. advenaria, .75mm., ovoid, tapered, shiny, slight reticulation, green to orange red.

Venilia maculata, .7mm., ovoid, shiny, faintly pitted, pale green.

Semiothisa notata, .6mm., ovoid, shiny, boldly pitted, green and brown.

S. alternata, .55mm., ovoid, shiny, boldly pitted, green and red.

S. liturata, .7mm., ovoid, shiny, boldly pitted, green and red.

Hybernia rupicapraris, .65mm., long ovoid, dull, matte, covered with dirt, pale green to purple.

H. leucophaearia, .65mm., ovoid, dull, matte, covered with dirt, purplish.

H. aurantiaria, .7mm., long ovoid, shiny, bold long ribs, red and green.

H. marginaria, .75mm., long ovoid, shiny, long ribs, green.

H. defoliaria, .85mm., long ovoid, shiny, faint reticulations, yellow.

Anisopteryx aescularia, flat? .6mm., nearly spherical, shiny, covered with hairs, golden brown.

Phigalia pedaria, 1mm., long ovoid, shiny, matte, pale olive green.

Apocheima hispidaria, 1.1mm., long ovoid, shiny, faintly pitted, greenish copper.

Nyssia lapponaria, .95mm., ovoid, dull, reticulated, bright green.

N. zonaria, .9mm., ovoid, dull, reticulated, bright green.

Lycia hirtaria, .75mm., short ovoid, shiny, reticulated, emerald green.

Pachys strataria, .7mm., ovoid, shiny, long rows of pits, one end smooth, emerald green.

P. betularia, .75mm., ovoid, dull, faint long rows of pits, one end smooth, dull sage green.

Hemerophila abruptaria, .8mm., ovoid, shiny, very bold hexagon, pale purple.

Boarmia cinctaria, .75mm., long ovoid, shiny, long rows of fine pits, light green.

B. gemmaria, .85mm., long ovoid, long rows of bold pits, green.

B. abietaria, .85mm., long ovoid, shiny, long rows of pits, green tinged reddish.

B. repandata, .75mm., long ovoid, shiny, finely pitted, green.

B. roboraria, .7mm., ovoid, shiny, long rows of bold pits, green and red.

B. consortaria, .75mm., long ovoid, shiny, long rows of fine pits, bright green.

Cleora angularia, no example.

C. lichenaria, .75mm., ovoid, shiny, bold shallow pits, green, turned purple red.

C. jubata, no example.

Tephrosia bistortata (crepuscularia), .8mm., ovoid, shiny covered with hairs, almost smooth, pale blue green.

T. luridata, .65mm., ovoid, shiny, long rows of pits, green and red.

T. consonaria, .75mm., long ovoid, shiny, long rows of pits, green.

T. punctulata, .75mm., long ovoid, shiny, long rows of pits, pale green.

Pachytenema hippocastanaria, .8mm., long ovoid, shiny, finely pitted, orange.

Gnophos obscurata, ·75mm., ovoid, shiny, long rows of shallow pits, pale lemon to orange red.

G. myrtillata (*obfuscata*), upright, 1mm., ovoid one end blunted, shiny, faint long ribs, brown tinged rosy.

Psodos coracina, 1mm., ovoid tapered, shiny, nearly smooth, colour not noted.

Fidonia carbonaria, ·7mm., ovoid, shiny, strongly pitted, green to red.

F. limbaria, no example.

Ematurga atomaria, ·65mm., long ovoid, shiny, long rows of pits, yellowish green.

Bupalus piniaria, ·8mm., ovoid, shiny, nearly smooth, green.

Selidosema ericetaria, no example.

Thammonoma wauaria, ·65mm., ovoid, shiny, long rows of strong hexagonal pits, green to red.

T. brunneata, no example.

Lozogramma petrarica, ·6mm., short ovoid, shiny, bold long ribs, yellow to reddish.

Chiasmia clathrata, ·6mm., ovoid, shiny, pitted all over, green.

Scodiona fagaria, ·85mm., ovoid flattened, shiny, matte, pale yellow thickly blotched with purple.

Scoria lineata, 1mm., very long ovoid, shiny, faintly ridged, yellowish brown marked with red.

Aspilates gilvaria*, ·8mm., very long ovoid ends square, dull, long rows of faint pits, orange red.

A. ochrearia, ·8mm., long ovoid ends flattened, shiny, long rows of faint pits, lemon yellow to brown.

Perconia strigillaria, ·8mm., ovoid, ends flattened, shiny, long ribs, rich yellow.

ZYGAENIDAE.

The *Zygaenidae* are divided into 10 species and 2 genera. I cannot see much difference in the ova of the 8 species I have examined. All are yellow in colour with a thin shell, which is much wrinkled lengthways; ovoid in shape and not varying sufficiently to be described as long or short. All appear to be flat eggs. There is some difference in the method of oviposition. *Filipendulae* appearing to lay in a conglomerate mass, with the eggs piled upon one another, while *trifolii* and *loniceræ* appear to be content with one layer at a time. All the eggs as they mature show a transparent space at one end, which does not appear to be occupied by the larval contents. The two species of *Ino* examined are rather longer eggs, but otherwise appear to be similar.

Zygaena purpuralis, ·85mm., ovoid, nearly smooth, yellow.

* *aspitates*.—HY. J. T.

- Z. exulans*, 1.1mm., ovoid, reticulated, yellow.
Z. achilleae, no example.
Z. meliloti, 1mm. ovoid, faintly ribbed, pale yellow.
Z. trifolii, 1mm., ovoid, reticulated, yellow.
Z. loniceræ, 1.1mm., ovoid longer, reticulated, yellow.
Z. filipendulæ, .9mm., ovoid shorter, shiny, reticulated, pale yellow.
Ino globulariæ,* no example.
I. statices, .65mm., long ovoid, reticulated, pale yellow.
I. geryon, .8mm., long ovoid, nearly smooth, yellow.

COCHLIDIDAE.

There are 2 species and 2 genera. These appear to be rather shapeless, transparent masses of jelly, with no special features. Very much flattened and with a dull matte surface.

Cochlidion limacodes, 1.3mm., ovoid very flattened, dull, transparent yellowish.

Heterogena asella, .5mm., ovoid, dull, matte, transparent whitish.

COSSIDAE.

There are 3 species and 3 genera. In these again the eggs appear to be primitive, thin shelled and much inclined to shapelessness. *Cossus* shows much fine reticulation and is coloured with light and dark browns, while *pyrina* is uniformly yellow. *Castaneæ* I have not so far examined.

Cossus cossus, 1.5mm., ovoid, dull, finely ribbed, brown to white.

Zeuzera pyrina, 1mm., ovoid, dull, reticulated very finely, pale dull yellow.

Phragmatoecia castaneæ, no example.

SESIIDAE.

There are 15 species and 3 genera. These seem to be of a very definite type, flat ovoid flattened at one end and with a fine hexagonal network on the shell. They are all dark brown or nearly black in colour and are probably laid singly on the bark. *Crabroniformis* will sometimes lay on a leaf, and I have seen wild-laid ova in this situation. *Sphéciformis* in confinement appeared to prefer to oviposit through the holes of a perforated zinc cylinder, the egg being found on the outside of the cage, while the insect remained within.

Trochilium apiformis, .8mm., ovoid, one end flattened, dull, matte, red brown.

* = *cognata*.—HY. J. T.

T. crabroniformis, 1mm., ovoid, one end flattened, dull, matte, red brown.

Sciapteron tabaniformis, no example.

Sesia scoliaeformis, no example.

S. spheciiformis, .8mm., ovoid, one end flattened, dull, pitted all over, dark brown.

S. andrenaeformis, .75mm., long ovoid, one end flattened, dull, finely netted, nearly black.

S. tipuliformis, .75mm., ovoid, one end flattened, dull, finely pitted, dark brown.

S. vespiformis, no example.

S. myopaeformis, no example.

S. culiciformis, no example.

S. formicaeformis, no example.

S. ichneumoniformis, .65mm., long ovoid, dull, finely pitted, black.

S. muscaeformis, no example.

S. chrysidiformis, .8mm., ovoid, dull, matte, brown and black.

S. flaviventris, no example.

HEPIALIDAE.

There are 5 species and 1 genus. Another group showing little variation, all the eggs being spherical turning from white when laid to black in colour, and having little or no sculpture on the shell. They appear to be dropped amongst the herbage and not fixed to any support.

Hepialus humuli, .6mm., spheroid, dull, matte, sooty black.

H. sylvina, .65mm., spheroid, dull, matte, sooty black dusted over whitish.

H. fusconebulosa, .65mm., nearly spheroidal, dull, smooth, black.

H. hecta, .65mm., spheroid, dull, matte, dead black.

H. lupulina, .6mm., spheroid, dull, matte, sooty black.

This brings me to the end of South's second volume and until I am able to obtain material for the description of the ova of those species marked "no example" in my schedules, to the end of my subject. I hope that any entomologist, who obtains ova which have not yet been photographed and described, will give me the opportunity of dealing with them.

Wegener's Theory of the Displacement of the Continents.

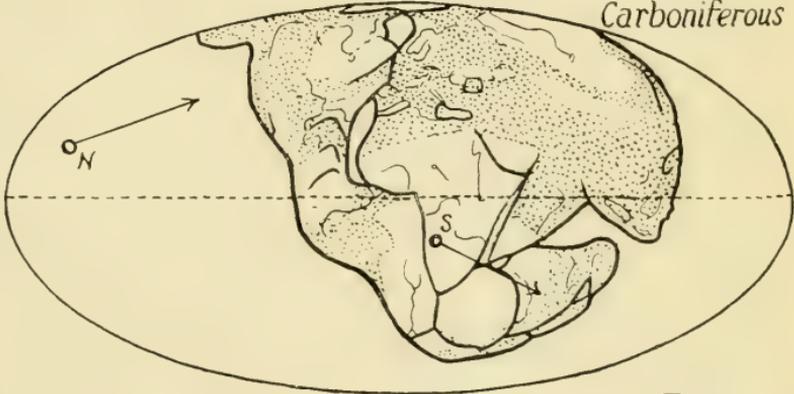
(Plate V.)

By K. G. BLAIR, B.Sc., F.E.S.—*Read May 26th, 1932.*

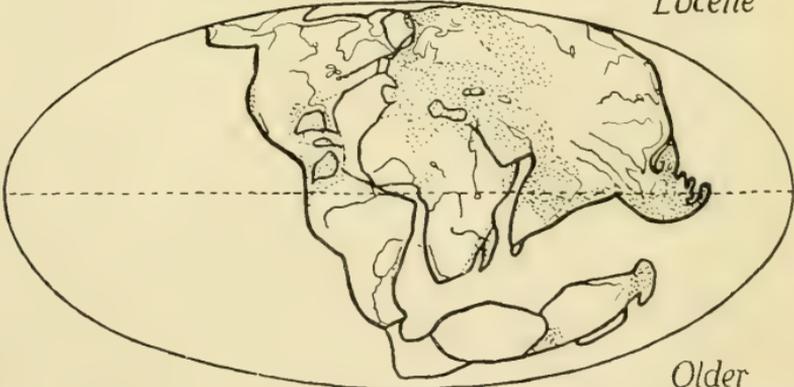
I wish to direct your attention to a subject a little outside the usual line of our papers, yet one that to my mind has received too little consideration from scientific people in this country. I refer to Professor Wegener's hypothesis of the displacement of the continents as set forth in his book "The Origin of Continents and Oceans." This theory is no longer new, indeed it was first propounded so long ago as 1912, while the English translation of the book appeared in 1924, the original German edition dating from some two years earlier. Nevertheless many people in this country appear to have but the vaguest notions of what this theory is about, or indeed never to have heard of it, yet it seems so eminently reasonable and at the same time simple a solution of so many and varied problems, and above all to throw so much light upon our studies of the origin and present distribution of animal and plant life upon the earth, that a brief consideration of some of its aspects should I think prove of interest to the members of this society.

The distribution of land and water upon the surface of the earth has excited the interest of the enquiring mind for some centuries, ever since in fact the true form and movement of the earth have been recognised. We have wondered why and how the continental masses as we know them, separated by the deep hollows of the ocean basins, came into existence. For some time the theory, formulated I believe by G. H. Darwin, most generally accepted was that in the process of shrinkage and consolidation from the primeval gaseous nebula, the attraction of the sun set up in the mass of the earth a tidal bulge or bulges that eventually split off from the contracting mass, the gaps left by them constituting the great hollows now occupied by the Pacific, Atlantic and Indian Oceans, the disrupted masses themselves subsequently combining to form the moon. It was suggested that a similar process of world-building is still to be observed in the case of the planet Saturn, whose well-known rings consist of matter left behind in the shrinkage of the central core but which has not yet combined to form a definite satellite or series of satellites of that body.

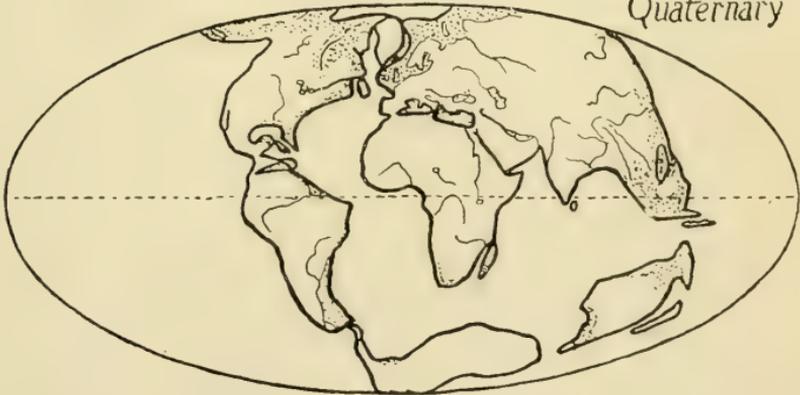
Upper
Carboniferous



Eocene



Older
Quaternary



Subsequently, somewhere about the beginning of the present century, an alternative theory was proposed, which may be called the theory of tetrahedral shrinkage. This postulated that a spherical body on cooling and contracting would not contract equally all over its surface, like the shrivelling of a drying apple, but would tend to form four great hollows, one, say, at the top, and three round the sides, these hollows separated of course by ridges; in short, that the sphere would tend to form a tetrahedron, that is a pyramid on a triangular base. If we imagine the earth in the form of a rubber ball with these four hollows in it the idea becomes plain. The intervening ridges represent the land masses, the hollows the oceans; thus we have the top, so to speak, of the world, or the base of the pyramid, occupied by the hollow of the Arctic Ocean; one ridge, broadest at the top and narrowing gradually downwards, represents the American continent, another roughly similar in shape, represents Europe and Africa combined, the third, somewhat out of shape perhaps (but then we must not expect an absolutely precise adherence to the mathematical figure) by Asia through Melanesia to Australia and New Zealand. This theory certainly presented many attractive features as compared with that of casual chunks flying off from the earth to form the moon.

Both these theories, it will be noted, tacitly assume that the present areas of land and water are, apart from regional invasions and retreats of the sea of relatively minor importance upon the land surface, as they always have been and unalterable.

Wegener, on the other hand, disputes this fundamentally. He considers, as is generally admitted by geologists, that the land masses are composed of a lighter rock, composed predominantly of silica and alumina, referred to for brevity as 'sial,' whereas the underlying deeper layers of the earth's crust are composed of heavier material, the main constituents of which are silica and manganese and to which he applies the term 'sima'; that the continental sial masses are relatively hard and rigid, floating upon, and partly submerged in, the heavier but relatively plastic or viscous sima base, much as ice-floes float upon the surface of the sea. This implies that the floating sial masses are not fixed and anchored, but in the course of time can force their way through the sima, and further that the original single floating sheet cracked and split in various directions, the resulting blocks gradually drifting farther and farther apart.

This theory of the drifting of the continents was founded upon the observation, that has probably been made independently by every one of us, of the remarkable coincidence in outline of the opposite coasts of the Atlantic Ocean, how the great projection of Brazil would apparently fit into the Bight of Benin of Africa, while the great bulge of Senegal and West Africa would occupy the recess between the north coast of South America and the Atlantic coast of

the United States. We must of course be careful in considering the outlines of these continental blocks not to regard only the present coastline; the true limits of the blocks are better represented by the steep declivity to oceanic depths that occurs about the 100 fathom line, it may be hundreds of miles beyond the actual coastline.

Consideration of the geological structure and of the fossil contents of these now widely separated areas, as for example South America and Africa, show such remarkable similarity that the conclusion is inevitable that the beds on one side of the Atlantic were laid down in close proximity to, indeed in contiguity with, those of the other side, and it is only after a certain geological horizon that differences arise showing that these conditions no longer held. Thus it is possible to date roughly the period when the split occurred, and it is found that this date varies; that whereas in the south the severance of S. America from Africa occurred in Cretaceous times yet Greenland remained in contact with Norway until the end of the Tertiary or even into Quaternary times.

Similarly India was formerly adjacent to East Africa, but in this case in addition to the drifting apart of the two continents the correspondence is obscured by the fact that India has undergone a tremendous degree of shrinkage and folding to form the great mountain chains of Central Asia. This folding took place comparatively recently, in tertiary times, resulting in a shortening of the peninsula by some 3,000km.

Strongly in favour of this theory of the drifting apart of the continents is the simplification it affords of many phenomena that have long been a puzzle to students both of geology and of biology. To take an example from geology:—

Evidence of ice-action in Carboniferous times has been found in southern Australia, S. India, S. Africa, the Congo, Togoland, and S. America as far north as Brazil; according to the present distribution of land and water this would indicate an ice-cap covering the greater part of the southern hemisphere. About the same time the great coalfields of Europe, N. America and China are evidence of the presence of a tropical belt in that region.

If now we consider these data in the light of Wegener's theory we find all these ice-marked areas grouped more or less closely together, so that with a south pole situated somewhere near the point of junction of S. India, Mozambique and Cape Leeuwin, an ice-cap of quite moderate extent would embrace them all, while our belt of coal-fields would all occur close to the equator of that period.

The period under consideration, extending from the Lower Carboniferous to the Permian, was of very considerable extent and conditions were not uniform throughout. Thus it is found that certain beds containing *Glossopteris* lie above the boulder-clay left by the ice in Africa and India but below it in Australia, proving

that ice conditions prevailed in Africa and India at an earlier period than in Australia; in other words that during this period the centre of the ice-cap, the South Pole, moved from somewhere in the region of Loanda, past the point of India almost to Central Australia, a very considerable distance as these countries are now situated, but only a fraction of this distance on Wegener's map. While the south pole was wandering round in this manner the north pole was of course moving correspondingly, but its area of movement being in the middle of the north Pacific Ocean, no records corresponding to those registering the movements of the south pole have been left for our information. As with the poles so with the equator; a similar migration is found from the Lower Carboniferous coals from Spitzbergen to Scotland, the Middle Carboniferous extending to Brittany and Upper Silesia and the Upper Carboniferous to western Auvergne, Baden and Laibach.

That there had been some such wandering of the poles has long been recognised by many competent geologists, but it has not hitherto been found possible to formulate any scheme that was applicable to the present-day distribution of land and water on the earth's surface; conditions that necessitated a certain position for the equator in one continent were quite inapplicable to another. "In fact, it is no longer merely a question of simplification which the displacement theory provides, it rather affords the first possibility of any explanation whatever."

Whether the sialosphere, this outer, lighter layer of the earth's crust, of which the continental masses are composed, ever formed a complete shell around the earth is a point left by Wegener more or less open. He points out, however, that the present area occupied by the continental blocks, *i.e.*, the fragments of the original sialosphere, is about $\frac{1}{3}$ the area of the earth's surface, while it has been calculated that in carboniferous times it occupied about $\frac{1}{2}$ of the surface, the reduction in area being an increase in thickness due to foldings since that epoch.

In this connection Wegener writes:—

"It is of great importance that the most ancient Archean rocks are strongly disturbed and folded everywhere on the earth. It is only from the Algonkian onwards that we find, besides the folded rocks, here and there non-folded or but slightly folded deposits. If we pass to the post-Algonkian period we see how the extent and number of the rigid unyielded masses increase more and more, and consequently the area of the foldable portions of the crust become increasingly limited. This applies particularly to the Carboniferous and Permian thrusting. The folding forces gradually weaken more and more in the post-Palaeozoic, in order however to re-awaken again in the Upper Jurassic and the Cretaceous, and to attain a new maximum in the Lower Tertiary periods. But it is very significant that the area affected by this most recent great mountain thrusting

is considerably less than that of the Carboniferous folding." ("Kayser," 1918).

The average thickness of the continental blocks is calculated as being about 100 km. ; if the folds were all smoothed out this would give a complete sialsphere of about 30km. thick, the whole being covered by water to an average depth of $2\frac{1}{2}$ km. Thus by a strange and devious route we find ourselves gazing at a picture not dissimilar from the old familiar one presented by Genesis I. 2, 'And the earth was without form and void ; and darkness was upon the face of the deep. And the spirit of God moved upon the face of the waters.'

If this picture correctly represents a stage in the history of the earth it means that the crust or sialsphere remained intact until the surface had cooled sufficiently to allow of the condensation upon it of this vast volume of water. Possibly however the first ruptures in the cooling crust, the earliest and most widely distributed shrinkage-cracks and foldings of the sialsphere, occurred long before the condensation of water upon the surface became possible, and that when this did occur, great cleavage gaps in the sialsphere, with exposure of the sima in the hollows, were already in existence, thus limiting the primitive oceans from their very birth.

Turning now to some biological considerations, it is generally considered, that all life now upon the earth has had an aquatic origin. We know of no pre-Silurian air-breathing animals, and the first land plants have been found in the Upper Silurian. Even in the Lower Devonian "nearly all the plants were small and herblike and of little rigidity not far removed from an aquatic vegetation. But in the Upper Devonian the flora is already similar to that of the Carboniferous, the comparatively rapid advance being accounted for as an adaptation to the new mode of life in the air."

Further independent support to Wegener's theory is provided by the theory of isostasy, or equilibrium in the earth's crust, which was formulated to explain the local depression or sinking of the earth's surface under heavy loads such as increase in the thickness of the crust due to folding and the formation of mountain chains or to the superimposed weight of a large mass of ice such as the polar ice-caps.

Many other arguments are brought forward all confirming the theory that since the first rift the gaps have opened wider and wider, the movement of the blocks being due to two main forces, first a drift from the poles towards the equator, and second a thrust westwards. In attempting to trace the movements it is necessary to remember that these two directions have not remained constant throughout, but with the migrations of the poles the direction of the drift away from them has altered ; similarly with the westerly drift, the westwards of the early stages of the movement was by no means identical with the westwards of to-day.

But from our point of view as students of the geographical dis-

tribution of animals and plants this theory of the former continuity of continents now separated by thousands of miles of ocean is of primary importance. It has long been recognised by zoologists, for example, that numerous points of affinity exist between the faunas of Australia and S. America. The marsupials, for instance, are found in these two continents only, and must have had a common origin, or at any rate had some line of intercommunication in the distant past. Again in the beetles we have the large and distinctive Buprestid genus *Stigmodera* in Australia and the very similar and closely allied genera *Conognatha*, *Pithiscus*, *Zemina*, etc., in S. America, the genus *Curis* common to both, and many similar cases. Certain genera of Diptera also occur nowhere else but in these two continents. On the tacit assumption that the relative positions of these land areas had remained unaltered the only mode by which the interchange of faunas could be effected seemed to be the existence of a former communicating land area that by subsequent depression had disappeared beneath the ocean. For similar reasons the existence of former land areas now drowned beneath the waves has been postulated to connect East Africa with India, North America with Europe, etc. The relics of such lost continents were assumed to be visible in groups of oceanic islands, as for example in the Azores, a group of peaks of the lost Atlantis, the Seychelles a relic of the former Lemuria, South Georgia, Kerguelen, and others, of the former Gondwanaland.

Such wholesale assumptions of former continents, though apparently necessary to explain the facts of geographical distribution of to-day, seemed nevertheless to have something about them of the fantastic, and called moreover for a much wider distribution of the forms concerned than seems consistent with what we know of their relics of to-day. If we can accept Wegener's theory many, though by no means all, of the problems presented by the present distribution of plants and animals are immensely simplified, cease in fact to be problems and become the natural results of such former territorial contiguity.

It is curious to note, that with the migration of the poles and the consequent movement of the equator from what are now the arctic regions in Palaeozoic times to its present position, there are two areas on the earth's surface where tropical conditions have remained unaltered throughout this immense extent of time, these two being northern Brazil and Malaya. It is an interesting fact that in these two areas, and here only, we find the modern survivors of the tapir family, a group of which the fossil remains testify to a very much wider range in former times, but always in tropical conditions. The species of this group of animals never seem to have been able to adapt themselves to a colder climate, and as the tropical belt moved they appear to have simply died out instead of moving with it.

Another region the consideration of which gives some interesting results is the East Indian Archipelago. This has long been recognised as the meeting ground of two different faunal regions, the Oriental and the Australian, the line of division, first defined by Wallace, running between Borneo and Celebes, and between Bali and Lombok. Geographically there would appear to be no barrier between these two faunas; if the Australasian fauna were derived from the Indo-Malay fauna it must have traversed the whole series of islands. Yet a marked line of separation exists, not quite sharp it is true, but with a moderately narrow zone of transition, of interpenetration. Once more Wegener offers a simple explanation of the difficulty. According to the displacement theory the separation of the Australasian from the Indo-Malayan block was one of the earliest rifts to occur in the splitting up of the original sialosphere, this separation remaining distinct and absolute until comparatively recent times, when the Australian block, with New Guinea and its associated islands, again crashed into the Asiatic block forcing some of its islands out of line and distorting their outlines. With this renewed proximity we find interchange of faunas now coming into play, resulting in a transition zone of recent origin between the two ancient faunistic regions, and the pouring into Australia *via* New Guinea and Cape York of an immigrant flood of species of Asiatic origin.

Again, in the Atlantic rift we have already seen, that though in the southern hemisphere the split originated as far back as Cretaceous times, yet Greenland remained in contact with Norway at least until the end of the Tertiary period, and faunistically Greenland yet remains essentially European rather than American. Having recently had occasion to investigate the beetles of Greenland I was somewhat astonished to realise that, apart from 15 species that have no doubt been recently introduced by commerce, of the 33 species that may be regarded as native 20 are of holarctic distribution, 10 occur in northern Europe and Siberia, while 1 has not yet been found elsewhere than in Greenland. The remaining two recorded species are North American and are not known from Europe; but both of these are dependent upon old and somewhat doubtful records that lack confirmation by recent collectors. Both are known from Labrador, and the Greenland records are probably erroneous. Having regard to the present position of Greenland with respect to North America and Europe, this result is not a little surprising, but a glance at Wegener's map of the older quaternary period shows an extensive rift between Greenland and North America as already in existence, while its contiguity with western Europe was hardly broken.

The study of island groups affords many points of interest. There are many instances in which such groups form as it were festoons depending from the posterior edge of the drifting continents, that

have got caught in the sima, and broken off and lagged behind in the westward drift of the main mass of the continent. Such festoons are to be seen in the West Indies, off the American continent, a regular succession of them in the Kurile Islands, Japan and the Loo Choo Islands, and the Philippine Islands off eastern Asia and the New Zealand festoon off the Australian continent. In certain cases it is suggested that the islands off the continental coasts have been torn off from beneath the block and floated to the surface. A systematic study not only of the structure but of the fauna of these islands would probably bring to light much useful information on these points.

It must not however be assumed that this theory of the drifting of the continents provides the solution of all our distributional difficulties. There are numerous cases of peculiar and puzzling distribution upon which it does not appear to throw any light. There is the case for example of another beetle genus which I have recently had occasion to look into, *Brachypsectra*, Lec., of which the larva was for twenty-five years one of the puzzles of coleopterists (see "Trans. Ent. Soc. London," 1930, p. 45). Of this peculiar and isolated genus one species exists in Texas, one in S. India and another in Singapore, points that can never have been less widely separated than at present.

Another problem that would perhaps repay examination in the light of this theory, if indeed this has not already been done, is that of the migration of birds. Though it may perhaps suggest a reason for some of our winter visitors, such as Widgeon, Golden Plover. Oyster-catchers, etc., seeking Iceland for their summer residence, yet it is doubtful whether it would afford much information as to why our Swallows, Wagtails, etc., should cross the equator to South Africa on the approach of winter, or why our Cuckoos, travelling by a different and more easterly route should repair to East Africa.

Though it is now nearly twenty years since Wegener first enunciated his theory, and nearly eight since the English translation of the more mature version of it as given in his book appeared, it does not, at any rate so far as the geologists are concerned, appear to have won general acceptance. The difference in consistency between the more acid uppermost layers of the earth's crust, the sial, and the more basic, heavier and more viscid deeper layers of the sima was indeed generally recognised before Wegener's theory was proposed, but that the viscosity of the sima should allow such a degree of movement in it of the sial masses, even in the immense periods of time at our disposal, seems to be a great stumbling block to the general acceptance of the theory.

A further difficulty perhaps is to explain the adhesion into one single sheet occupying about half the surface of the earth of the sial mass after the first ruptures of the universal crust.

Let us glance for a moment for purposes of comparison at another

book written shortly after Wegener's book appeared, "Our Mobile Earth," by R. A. Daly (1926). This is a study of earthquakes and the vulcanicity of the earth and we find in it a good deal in common with "The Origin of Continents and Oceans." We have the same idea of the continents as floes of more solid structure floating upon a more viscous substratum; we have it impressed upon us that the Pacific Ocean is of very much earlier origin than any of the other oceans and we find stressed the fact that the present extent of the crust-blocks is immensely contracted owing to folding and overthrusting, in other words to mountain-building, from the area it once occupied, in fact that the solid crust must at one time have been a complete shell around the earth, uniformly covered by ocean. We have also the idea that once this uniform crust became broken up into blocks these blocks moved in their relative positions to one another, or floated apart or together upon the more viscous substratum. So far the two writers seem to be independently in accord, but from this point they differ. Daly, seeking to find some cause for these movements of the continental blocks, notes that the great earth masses lie either towards the poles or along the equator, and can only suggest that the heavier, higher masses tend to slide downhill into the troughs, squeezing and crushing the thinner crust of this area and thus forming the east-and-west running mountain chains so conspicuous in Europe and Asia, and to some extent in America, and discernible even in the southern hemisphere. It is true, that he does not insist upon this explanation, indeed rather deprecates it, merely putting it forward as the best that he can suggest. Though he mentions Wegener's theory yet he does so only very briefly, admitting that it 'must be seriously entertained as the true basis for a sound theory of mountain-building.' He also states that Wegener does not show *why* the continents should move. One is left with the impression that at the time of writing (the book was published only two years after 'The Origin of Continents and Oceans') he had not read Wegener's book. He may possibly have seen some of Wegener's earlier, less developed writings, or possibly only extracts or criticisms of his work, for he makes no mention of Wegener's constant insistence upon the double direction of movement, the drift from the poles and the westward drift, and no mention either of the migration of the poles and the simplification of this hitherto insoluble problem that Wegener's work affords. Wegener's theory indeed appears to throw so much light where Daly was merely groping in the dark that one feels that the latter part of Daly's book would have been altogether different had its author been familiar at first hand with Wegener's work.

Though we may not perhaps as yet be able to accept Wegener's theory of the drifting of the continents as definitely established, and no doubt much critical work yet remains to be done by workers in the different sciences involved, geology, biology, meteorology and

geophysics, each of which has its own problems as well as many problems that are really more or less in common though viewed from different angles, yet its strength would appear to lie in its simplicity and its wide applicability in all these different lines of research. I cannot but think that the theory has come to stay, and like the theory of evolution it will pass from the rank of hypothesis into that of accepted fact, and that controversy concerning it will become more and more limited to matters of detail such as the relative importance of the various factors involved.

PLATE V.

Reconstructions of the map of the World for three geological periods according to the Displacement Theory (after Wegener.) The dotted areas represent those parts of the continental blocks that were submerged beneath shallow seas. The arrows in the upper figure represent the movements of the N. and S. poles during carboniferous times.

Plant Galls and their Causers.

By M. NIBLETT.—*Read July 14th, 1932.*

The systematic study of plant galls is of comparatively recent date, but they were known to the ancients. Pliny, the Roman naturalist, was aware of the fact that flies emerged from galls, but he, and many others, mixed facts with superstitions, and evolved many weird theories regarding their cause.

The first systematic writings on galls were those of an Italian physician in 1686, and of Dr. Derham, Canon of Windsor, who in the Boyle Lectures in 1711-1712 recorded his observations. Linnaeus and Fabricius do not appear to have known of these writings. Most of the early observations appear to have been made on oak-galls.

Linnaeus seems to have grouped many species of parasitic *Hymenoptera* with the true gall-causers under the title of *Cynips*. Westwood in 1839 worked on this group, gave some details, and called the family *Cynipidae*. Hartig was the first to improve the classification; he separated the true gall-causers from the parasites, and sub-divided these into true parasites, inquilines and commensals.

There are two questions asked frequently in connection with these growths—1. What is a gall? and 2. How are galls made?

The first question is fairly easy to answer: a gall may be considered to be any enlargement of plant cells, tissues or organs, induced by the stimulus of a parasitic organism; there appears to be a tendency to include under the category of galls, some rather doubtful cases, but one must admit anything wherein there is a proliferation of the plant cells.

The second question is more difficult to answer; there have been many theories put forward at different times; some of the earlier naturalists observed that when a gall insect deposited its eggs in the plant tissue, a drop of liquid was injected into the plant, and it was surmised that this was an irritating fluid which was the cause of the gall growth. In recent years careful investigations have suggested that the cause is chemic, and Professor Erwin F. Smith came to the conclusion that the main cause of *Zooecidia* (animal caused galls) was the anal excretions of the inhabitants. There were certain objections to this theory, in for instance the case of the Cynipid galls, as the larvae were supposed not to have a complete

alimentary canal; but A. Cozens of Toronto University, after a careful study of serial sections of several species of Cynipid larvae, claims that the alimentary canal is complete, and that they possess an anus. This observer also found that these larvae secreted a salivary gland enzyme, which changes starch into sugar, and concludes that this, acting upon the starchy constituents of the nutritive zone, provides a supply of nourishment for both the larva and the gall.

From this, it would appear that the chief cause of gall growth is not so much a question of irritation of the plant tissues, as the provision of an increased supply of nourishment, which causes an increase of cell division, and consequent increase in growth, at the point affected.

As to the reason for the many diverse forms which galls assume, I should not care to offer any suggestion, but it has been, I believe, definitely proved that there is no appendage of the gall, hair, spines, etc., not apparently normal to the part of the plant where the gall is formed, but their prototypes can be found on some other part of the plant, or on a closely allied species.

If a method could be devised to induce the formation of artificial galls, which would actually grow, under the influence of the applied stimulus, we could no doubt solve the problem of how a gall is made, but up to the present all experiments in this direction have failed. A number of attempts have been made to produce artificial galls; plants have been sprayed with solutions of, or have been exposed to the vapours of, organic and inorganic compounds; injections of these substances have also been made into the plant tissue, with the result that blisters have been formed with a certain amount of cell proliferation, but no further growth could be induced; freezing, and mechanical irritation have also been tried, with somewhat similar results.

The structure of plant galls varies very much, some are composed of a few greatly enlarged cells, others of a mass of cells uniform in character, while others are very complex in their structure, having a series of distinct zones, commencing with the nutritive layer surrounding the larval chamber, followed by zones containing starch, tannin, fat bodies, etc., the whole surrounded by a protective covering and finally an outer sheath; many of the oak galls are built up in this manner.

Plant galls may be divided into two sections:—

1. PHYTOCECIDIA: those owing their origin to parasitic plants; and 2. ZOOCECIDIA: those produced by animal parasites.

The former are caused by myxomycetes, bacteria, algae, and fungi; the latter by Eelworms (*Anguillidae*), Mites (ACARINA), and by insects of the following orders: RHYNCHOTA (Families *Psyllidae* and *Aphididae*); COLEOPTERA (*Cerambycidae*, *Curculionidae*); LEPIDOPTERA (*Gelechiidae*, *Sesiidae*, *Tortricidae*, *Elachistidae*); DIPTERA

(*Trypetidae*, *Cecidomyiidae*, *Agromyzidae*, and *Chloropidae*); HYMENOPTERA (*Tenthredinidae*, *Eurytomidae* and *Cynipidae*).

Eelworms are small nematode worms and are responsible for a number of galls upon roots and stems of various species of plants. *Heterodera radicola*, Müll., causes considerable swellings upon the roots of Beet, and about fifty other species of plants in various parts of the world. Another species, *Tylenchus tritici*, Bas., attacks the flowering glumes of various cereals, forming what are popularly known as "Ear Cockles." These creatures have remarkable vitality; Dr. Bastian has stated that the last mentioned species resumed its activity after remaining dormant for 27 years.

The gall mites, *Eriophyidae*, are a degraded type, having only four legs instead of the usual eight possessed by the members of the ACARINA. Their galls are of a simple form, consisting mainly of a puckering, or pouching, if on leaves, or if in buds or catkins a considerable swelling is caused; a familiar example of the latter type is "big-bud" on Currant, Birch, and Hazel. In the majority of Eriophyid galls there is a great increase in the growth of hairs, in fact some mite galls simply consist of an increase in the number and size of plant hairs in the axils of the leaf veins. These were noticed by the early botanists, and were thought to be of vegetable origin, and were named *Erineum*.

The galls caused by Aphids and Psyllids are also mainly of simple structure, although the life-histories of the former are very complex. These insects attack various parts of the plant, and give rise to galls upon root, stem, leaf and flower.

The *Psyllidae*, or jumping plant-lice as they are sometimes called, comprise relatively few gall-causing species, and their galls are confined almost entirely to the leaves, usually taking the form of thickened rolls in which the insects undergo their transformations. *Trichopsylla walkeri*, För., which causes thickened rolls on the leaves of Buckthorn (*Rhamnus catharticus*, L.), is a familiar example.

There are comparatively few beetles causing galls; these galls, as a rule, consist of a swelling of the part attacked, with the beetle larva snugly ensconced in the centre. The swelling of twigs of Aspen (*Populus tremula*, L.) by *Saperda populnea*, L., and the more or less globular swellings upon the roots of various species of *Brassica*, caused by several species of *Ceuthorrhynchus*, are no doubt familiar to most of you.

There are about sixty species of LEPIDOPTERA in Europe known to cause galls, and of these some dozen or more may be listed as British; the galls usually take the form of swellings of twigs or stems, and the majority of the gall-causing species belong to the section usually known as "Micros." I must confess to a very considerable ignorance of this section of gall-causers, which I believe have been rather neglected by Cecidologists; this leaves a field open to Lepidopterists who are looking for some fresh matter

to study. I have never given these gall-causers serious attention, and have failed entirely to rear any of the insects. Some of the species are not at all uncommon; *Gypsonoma aceriana*, Dup., in twigs of poplar, *Argyresthia goedartella*, L., in the catkins of alder, and *Heliozela stanneella*, Fisch. v. R., in the petioles of oak leaves being of comparatively frequent occurrence. There are also a number of species of Lepidoptera, which affect some of the larger galls as commensals, the larvae living through the winter in them, or using them to pupate in.

Dipterous galls are many and very varied, although their structure is of a rather simple character.

The *Cecidomyiidae* or Gall-midges are a large family of small delicate flies, with long fragile legs, long, and often very elegant antennae, while the females are provided with a long ovipositor. The term "gall-midges" which is generally applied to the family as a whole, is to my mind rather a misnomer, as there are many species which have no connection with gall-production at all.

The galls produced by these tiny insects often assume very large proportions, they attack the roots, stems, leaves, flowers, and sometimes the fruit of a great many species of plants; in some cases the larva is solitary in the gall, in others numerous larvae will be found together. The larvae are small legless creatures varying in colour from white to yellow, orange or red; the colour of the larva is often of great assistance in identifying a gall, as certain different species cause an identical gall upon the same plant, but have larvae of different colours.

The majority of the larvae are moderately active, and some have the power of leaping to a distance of several inches; another interesting feature in connection with the larvae of many species, is the possession of what is known as the "breast-bone" or "anchor-process," an organ on the ventral surface the use of which is still as far as I know, not satisfactorily explained.

The life-histories of these insects have been worked out in a number of cases, but there are very many species about which practically nothing is known; several of the gall-causing species have several broods a year, while others have only one, some larvae pupate in the gall, others pupate in the earth, and all form a puparium composed of material of thin paper-like consistency. The larvae are preyed upon by parasitic Hymenoptera, and predaceous larvae of their own family; moisture is essential for their well-being, but they can survive a period of desiccation if supplied with moisture afterwards.

The flower-bud galls caused by these insects are, I should say, the simplest in formation, the eggs are deposited in the unopened buds, the larvae feed among the floral organs, the result being, that the bud becomes swollen and the flower fails to develop.

There is extraordinary variation in the leaf galls caused by these

Cecids, some being a simple folding of the leaf, either a portion, or the entire leaf being involved; there may be a rolling of the edges with more or less thickening, or a pustular raising and thickening of the epidermis. The gall caused by *Craneobia corni*, Gir., on Dogwood (*Cornus sanguinea*, L.) is an extreme case; here we have a hemispherical projection, 6mm. or more in diameter, projecting from the upper surface of the leaf, and a tooth-like projection on the underside, sometimes as much as a centimeter in length; these galls contain a number of orange larvae each in a separate cell.

The midge galls upon plant stems usually take the form of a fusiform, or more or less globular swelling. Possibly the most striking example is the gall of *Rhabdophaga saliciperda*, Duf., on the stems of several species of *Salix*; on the willows it does not assume very great proportions, but on Willows it is not unusual to see a branch involved.

The *Trypetidae* do not give rise to a great number of galls. These may be found upon root, stem, or in the flower-head. The larvae are fat, barrel-shaped maggots, white, yellow, or grey in colour, and in the gall-causing species, sluggish in their movements, and pupating in the galls.

The flies vary in size, a number of species approaching the common house-fly in size; they have pictured wings, the markings usually being arranged in bands, from which they get their popular name "bar-wing"; the flies are rather bristly, and the females have a flattened, horny ovipositor, which in some species exceeds the length of the insect's body.

The most familiar stem gall caused by a Trypetid is that of *Euribia (Urophora) cardui*, L., found upon the stem of the creeping plume-thistle (*Cnicus arvensis*, L.). This may be found from August onwards, the flies emerging in June. The gall is a more or less ovate swelling varying from the size of a cherry up to that of a walnut; while growing it is green and glabrous, and not infrequently adorned with a tuft of leaves; inside are a number of cells, each containing a single larva.

The galls caused by Trypetids in the flower-heads of Composite plants may be divided into two groups; the first consisting of a hardening and thickening of the receptacle, resulting in a hard, woody gall containing numerous larvae, but giving no external evidence of its presence; while the other type is noticeable as a swollen and usually unopened flower containing but little material inside. *Euribia stylata*, Fab., is a good type of the former, and the gall may be found in the flower-heads of *Carduus nutans*, L., and of *Cnicus lanceolatus*, Willd., from August onwards, the fly emerging in the June following. The female of this species has an extremely long ovipositor, which is of course a necessity to enable it to deposit its eggs at the base of such large flowers as the above mentioned thistles.

Another very common gall is that caused by *Euribia solstitialis*, L., in the flower-head of the Black Knapweed (*Centaurea nigra*, L.), this again is invisible from the outside, although occupying over half of the interior of the flower-head; these galls may be found from July onwards, the fly emerging in June of the following year.

The second group of Trypetid galls in flowers are well represented by *Sphenella marginata*, Fall., on various species of *Senecio*, and by *Noëta (Carphotricha) pupillata*, Fall. on *Hieracium* (Hawkweed). Here we get a distinct swelling of the basal portion of the flower which remains closed.

There are several species of Trypetids causing swellings upon the roots or stem-base of different *Compositae*, but they are either very rare in this country, or very difficult to find.

The larvae of the gall-causing *Trypetidae* are subject to the attacks of parasitic Hymenoptera, chiefly Chalcids, although I have bred Braconids and Ichneumons from them.

The gall-causing Hymenoptera are among the most interesting of the gall insects; both their galls and the insects introduce us to some interesting phenomena.

Taking first the saw-flies (*Tenthredinidae*); parthenogenesis is common here, the males of some species being unknown; the galls of these insects begin to develop shortly after the egg is deposited in the plant tissue, and attain practically their full growth before the larva has hatched out; the larva eats away most of the tissue of the gall until frequently only a thin shell remains, and it has been stated that with some species, the larva will emerge from the gall at times, and after roaming around for a short period will return to the gall.

The substance of the gall is not differentiated into zones, the larva feeding indiscriminately upon any portion of the interior; some species make an exit hole for the frass, while in others the surface of the gall remains entire until the larva emerges to pupate. The larvae are typical saw-fly larvae, but are usually white or greenish in colour; when full-fed, they descend to the ground, or enter a crevice in the bark and there spin a cocoon in which they eventually pupate; the pupal period is short, as seems to be usual with the majority of Hymenoptera; a few species are double-brooded, but the majority have only one brood a year.

The "horse-bean" gall of the willows, which must be familiar to most of you, is caused by *Pontania proxima*, Lepel.; these galls may be found upon several species of willows, and also upon sallow; they vary somewhat in size and appearance, but apparently they are all caused by the same species of saw-fly.

Coming next to the *Cynipidae* we have here the most interesting phenomena connected with plant-galls.

A large section of this family is confined entirely to the oak (*Quercus*), and we have among these, gall-causing species, with

parthenogenesis, and alternation of generations, a sexual generation alternating with an agamic one ; also inquiline species.

The insects of this family cause galls to form upon root, stem, leaf, flower, and fruit of their host plant ; many of their galls being, as I have previously mentioned, very complex in their structure.

The males of some species which have no known alternate generation have never been discovered, although exhaustive search has been made for them, consequently the reproduction in these species is entirely parthenogenetic.

To illustrate the alternation of generations, I will offer as an example the " oak-apple " gall, which is familiar to nearly everybody ; some time in mid-winter there emerges from a gall upon the roots of an oak a dark brown apterous creature known as *Biorrhiza aptera*, Fab., this insect with infinite patience makes its way to the surface of the earth, and crawling up the trunk of the tree, and along a branch, it selects a dormant bud in which it proceeds to deposit its eggs ; in due course these eggs hatch, and with the approach of warmer weather the gall begins to develop, and finally we see what we know as the " oak apple " ; meanwhile the enclosed larvae have become full-fed, and after a short period in the pupal stage they emerge, not as heavy, wingless, dull-looking creatures, but as bright, brownish-yellow, winged insects, of both sexes ; after pairing, the females of *Biorrhiza pallida*, Oliv. as we call this generation, go down to the roots of the oak in which they deposit their eggs, producing galls upon these roots from which eventually the apterous agamic, *Biorrhiza aptera* will emerge, thus completing the cycle.

The reason for the length of time which some of the oak-frequenting *Cynipidae* spend in the larval stage is difficult to understand ; with some species, *Andricus globuli*, Htg., *A. collaris*, Htg. and *A. autumnalis*, Htg. for instance, the galls develop during the summer, and reach maturity in the autumn, when they usually fall to the ground, the larvae remaining in them until the second spring following, when after a short pupal period the imago emerges. These species each have an alternate generation, in which the gall reaches maturity in quite a short time, the perfect insect emerging in a very few months from the time the egg is laid.

With the above mentioned species and with many others, the procedure as stated is a regular occurrence, with some other species it occurs irregularly ; with *A. quadrilineatus*, Htg., and *A. fecundatrix*, Htg., we may get from a batch of galls some insects emerging at their normal time, while the remainder will emerge at about the same time a year later. *Cynips kollari*, Htg., also has this habit, and I have had the insect emerge three years after it was due to do so. The species whose longevity in the larval stage is the most remarkable is *Callirhytis glandium*, Gir., a species affecting the acorns of the Turkey oak (*Quercus cerris*, L.), a number of the

larvae may be found in each acorn, each in a separate cell at the base, the insects emerge in the spring, and their emergences may extend over a period of five or six years; from a batch of these acorns gathered by me in October, 1926, the flies emerged in March and April of the years 1929 to 1932; I can offer no suggestion as to why this long period should elapse, and can only state the facts as I have observed them.

It is usually understood that when a gall is separated from its host plant there is no possibility of its growth continuing. This is not the case with some of the Cynipid galls of the oak; the spangle galls, of which there are four species, are a case in point, these galls are attached to the leaves by a pedicel, and in the autumn they fall from the leaves to the earth, here they lie dormant until the early spring, when they begin to swell, they do not increase in diameter, but there is an appreciable thickening; when this takes place, the insect rapidly reaches maturity.

In the case of *Andricus inflator*, Htg., and *A. curator*, Htg., there is an inner gall containing the larva. In *A. fecundatrix*, Htg., there is also an inner gall, and when this is fully grown, it takes the form of a small cylinder; this becomes detached at the base, the scales of the outer gall spread out, and allow this inner gall containing the larva to drop out; the empty outer galls frequently remain upon the tree until the following year, while the larva continues to feed in its cylindrical case until it is ready for its transformation.

The inquiline *Cynipidae* are a group of insects in which the species are very difficult in many cases to separate one from the other, and also from some of the gall-causing species whose galls they infest. The larvae of these insects do not attack the gall causing larva, but may cause its death by absorbing its food supply; in large galls there is frequently enough material to supply food for both, but in the smaller galls, the gall larva is usually starved. The presence of these inquilines frequently causes a cessation of the gall growth, but in certain cases there is a considerable enlargement of the gall, suggesting that these species are a stage in the evolution of the *Cynipidae*.

The larvae of the *Cynipidae* are frequently attacked by parasitic Hymenoptera belonging to the families *Chalcididae*, *Ichneumonidae*, and *Braconidae*, and it is very difficult to say, whether these parasites emerging from the galls, were parasitic upon the gall-causing larvae, the inquiline larvae, or hyper-parasites of one, or the other.

There are a considerable number of *Cynipidae* causing galls upon plants other than the oak, these affect five families of plants; their galls are to be found upon leaf, stem, root, and flower; the texture of the galls is more or less cellular, with no differentiated zones, such as we find among many of the galls of the oak. There

also is another distinctive feature in this group of gall-causers, there is no alternation of generations, although parthenogenesis is not unknown, and a few species of inquiline *Cynipidae* also affect them. Parasitic Hymenoptera of the families previously mentioned, attack the larvae.

I have not time to describe in detail the various galls caused in this section, and will, therefore, mention a few as an illustration of some types of the group.

The genus *Rhodites* contains five species in Britain. *Rhodites rosae*, Htg., causes the familiar "robin's pin-cushion," or bedeguar, as it is sometimes called; this is a leaf gall; *R. eglanteriae*, Htg. (the pea gall), and *R. nervosus*, Curt. (the spiked pea gall), both found upon the leaf; these three species affect several species of rose including the sweet-briar (*Rosa rubiginosa*, L.). The gall of *R. spinosissima*, Gir. is found only upon the burnet rose (*R. spinosissima*, L.), while that of *R. mayri*, Schl., is found upon *R. rubiginosa*, L., and occasionally upon *R. micrantha*, Sm., and *R. canina*, L., this latter species of gall was discovered in the north of England a few years ago, and has since been found in several localities in Kent.

Two species of *Xestophanes* are found galling the roots of *Potentillas*.

Several species of the genus *Autacidea* have been discovered during the last few years by Messrs. Bagnall and Heslop Harrison, they are confined to the *Compositae*, while of the genus *Aulax* we have *A. papaveris*, Htg., which galls the seed-capsules of the common poppy (*Papaver rhoeas*, L.). *Lipsothenus latreillei*, Kieff., makes globular, spongy swellings upon the leaves of ground-ivy (*Nepeta hederacea*, Trev.). Another interesting species is *Isocolus jaceae*, Schr. the larvae of which I have found in the achenes of the black knapweed (*Centaurea nigra*, L.), causing them to swell considerably, this is not by any means a common species. I have bred comparatively few from several thousands of the flower-heads of this plant. Another gall which is of some interest owing to its position, is that of *Isocolus rogenhoferi*, Wach., this takes the form of an ovoid swelling on the inside of the involueral bracts of the great knapweed (*Centaurea scabiosa*, L.), and one can only find it by pulling out the interior portion of the flower. As far as my personal experience goes, all the insects of this group emerge within a year.

Chalcids parasitise the larvae of these insects very freely, and from the galls of *Aulax papaveris* I have bred a series of apterous Chalcids; these are the only wingless Chalcids I have had emerge, among the many hundreds of specimens of this family which I have bred from galls.

Phytocecidia frequently take the form of tumefactions upon the roots, although not confined to this part of the plant. I only propose to touch very briefly upon these growths.

Bacterial galls are to be found upon the roots in the form of nodules caused by the nitrogen-fixing bacteria. These are to be found upon leguminous plants. *Bacillus radicola* was supposed to be the species responsible for all these growths, but later researches have caused this opinion to be modified; each species of plant having its own particular form of bacteria.

Crown Gall, or Plant Cancer as it is sometimes called, affects many species of plants, both cultivated and wild; it is caused by *Bacterium tumefaciens*. It has been found in this country upon Plum, Rose, Loganberry, etc., but in some countries it is a serious pest, many of these growths attaining enormous proportions.

A few species of Myxomycetes, or Slime Fungi, are responsible for galls, *Plasmodiophora brassicae*, Wor. which is the cause of Club-root upon various species of *Brassica* is a typical example.

The galls caused by Fungi take the form of swellings of various types. The genus *Exoascus* causes "Witches'-brooms" upon several species of plants; these galls are woody.

Many of the rust fungi cause galls. These fungi have several stages, their galls in some cases being caused by one stage upon a certain species of plant, while another stage of the same fungus will cause a different type of gall upon another host. As an example we may take *Gymnosporangium clavariaeforme*, Jac., the Teleutospores of which cause spindle-shaped swellings upon the stems of Juniper (*Juniperus communis*, L.), while the Aecidia affect the leaves, stems, and fruit of Hawthorn (*Crataegus monogyna*, Jacq.).

In conclusion I would like to point out that I have endeavoured to give a general survey of Plant Galls and their Causers, which must be taken only as an introduction to a subject which covers a wide field, and is of absorbing interest.

A Home-made Light Trap for Moths.

(Plate VI.)

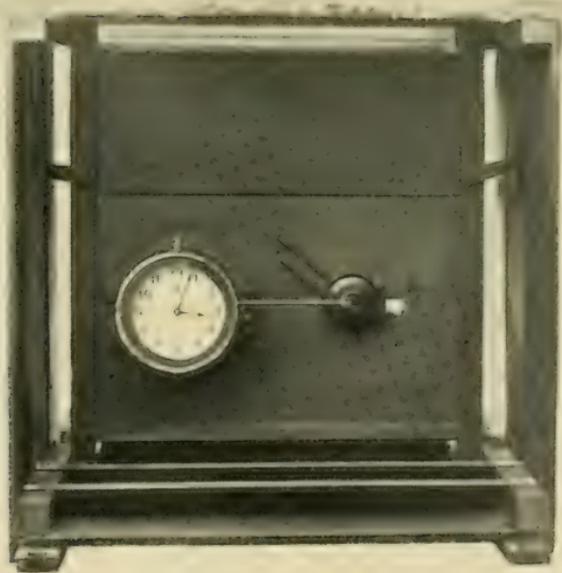
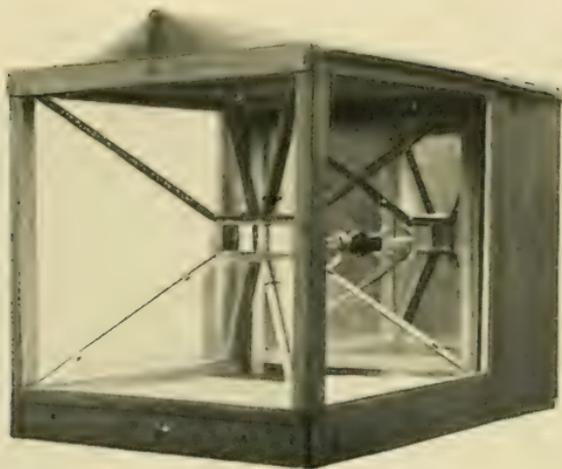
By M. and F. STANLEY SMITH.—*Exhibited at the Annual Exhibition on October 13th, 1932.*

Perhaps one of the first things anyone interested in insects should work out is the list of species occurring in his own neighbourhood. For years we have realised that one of the simplest ways of discovering these in the case of moths is to use light as an attraction late at night. The results obtained by friends, particularly Mr. E. E. Green of Camberley, who worked night after night in a lighted upper room, astonished us; and we found on the rare occasions when we did the same that we got species the existence of which in our locality we had not suspected. But having to work for our living by day, it was impossible to stay up night after night, so some form of trap was indicated.

According to report the "American Moth Traps" sold by the dealers did not seem to be successful. Our first attempt at a trap consisted of a long box with the opening at one end, a paraffin lamp at the other, and staggered sheets of glass to make a zig-zag entrance. This also was a failure. The spread of light was very restricted, and moths worked their way out just as easily as they did in.

Inspired by the description of Mr. de Worms' trap in the 1930 "Entomologist," and of Mr. Andrewes' lighted room in the 1931 issue, we decided to make another attempt. We worked on the idea of a trap complete in one piece and transportable. Mr. de Worms' trap evidently had an all-round spread (if used away from the house), but about 270° in a horizontal plane seemed to be about the maximum obtainable with a one-piece trap. We tried to combine the ideas for entrances suggested by Mr. de Worms' trap and Mr. Andrewes' pillar-box improvement. We were told that the failure of our early traps was largely attributable to the absence of dark places for the moths to rest, so decided to include a dark chamber. Electric light was available for use in the trap when at home. On these foundations we gradually evolved the form of trap shown at the Society's last Annual Exhibition, a front view of which, with the drawer partly drawn out for removal of insects, is shown in the first photograph.

We started on a framework 27 inches long (18 inches belonging



The Stanley-Smith Light Trap, Front and Back views.

to the light, and 9 inches to the dark, chamber) and 18 inches square in vertical section, as shown. This framework was built up of wood, all four sides of the dark chamber being boarded in, but only top and bottom of the light chamber. Then, having decided that the openings for moths should be 4 inches by 2 inches, we occupied the bottom two inches of the light chamber with an open drawer (in the photograph it looks as if the drawer is covered over, separating it from the light chamber, but actually there is no such division) so leaving for the 3 glazed entrances a space 18" by 18" by 16" high. This meant that all glasses could be cut to the same angles. The drawer was traversed with six loose slats sloped at 45°, was made to slide out from the front of the trap, and was all finally painted dull black.

The metal framework for the glass was the most difficult part to make, the central portion is a skeleton rectangular prism of light tinned-angle-iron, 4" by 4" by 2" high. Both at the top and bottom, but not visible in the photographs are \sqcup shaped pieces of flat tinned-iron, each leg 18" long and about 1" wide. These three parts are linked, corner to corner, as the photograph indicates by eight $12\frac{1}{8}$ " lengths of tinned-iron shaped \triangle , so that the vertical glasses fit into the slots, and the sloping glasses are held on to the short faces of the members by short slips of soft copper. After fitting the four vertical and 6 sloping pieces of 15 oz plain glass into this framework it is slid into the light chamber from the front, resting on three thin wooden ledges fastened inside the outer case of the trap just above the front edge and two sides of the drawer. The top \sqcup of the framework just touches the ceiling of the light chamber. Wooden beading screwed to the outer casing finishes off the front. When completed and glazed, it provided at the front and on either side funnel entrances of clear glass in the shape of truncated square pyramids 18" by 16" on the outside tapering to openings 4" by 2" giving access to the interior of the trap. In plan these three small entrances form a \sqcup , so there is nothing to stop moths flying through one opening and out at another; but in practice they generally soon find their way inside the trap. To restrict the exit further, we recently put two 4" squares of celluloid horizontally at top and bottom of the framework of the entrance. Results since happen to have been worse, but it is too early to judge the cause.

The panel dividing the two chambers, and carrying the lamp, etc., was built up of four lengths of wood 1" square, as shown. The central space, 14" square, was filled in, starting from the back, with board $\frac{1}{2}$ " thick, on the front of which an electric lamp batten-holder was fixed in the centre; then a square of three-ply board with a hole in the middle to clear the base-plate of the lamp-holder; then a sheet of 21 oz. silvered glass with a hole drilled in the centre to clear the neck of the lamp-holder, the glass being held in position

by fillets nailed to the frame. The lamp-bulb completed the front. The panel was held in position by stops in front, and by two short pivoted wooden catches behind. It leaves a space 1 inch wide all round it, giving access to the dark chamber from the front.

To avoid wasting current after sunrise called for an automatic time switch, but as the cheapest of these commercially cost over 30s., we had to make one. From an old alarm-clock we removed the bell and hammer; then drilled a hole near one side of a farthing, and soldered this around the spindle carrying the alarm spring, (we really *could* have afforded a halfpenny to give more movement, but it wouldn't go into the space). A hole was drilled in the clock case, and an arm added to the frame of the clock to act as a bearing for the push-rod, holding its inner end against the eccentric farthing. Two lugs were soldered on the clock case to drop into clips on a wooden block added to the panel to line the push-rod up on to the switch. The push-rod was a plain $\frac{3}{16}$ " brass rod with a U-shaped prong at the outer end to fit around the knob of the switch. Owing to the small lift of the farthing cam, the length of this rod had to be very accurately fitted to throw the switch. The switch, combined with a plug, had to be a "Crabtree" to operate in the right direction. The externals of these arrangements are shown in the second photograph.

Two loose slats at 45° across the bottom of the dark chamber, and a removable door fastened by projections engaging in slots at the foot, and with hooks and eyes at the top, completed the trap. The interior of the dark chamber was painted a dull black, and the top of the light chamber shiny white.

To keep out rain a roof of painted canvas was added later, but water still gets in from rain blown on to the glass.

So far, we have used a 60 watt gas-filled bulb connected with the house lighting circuit by workshop flex, passing through a notch in the side of the removable door and terminating in a 2-pin plug fitting into the Crabtree switch-plug, but when more moths are about again we propose to try out other forms of light, particularly, if possible, those rich in ultra-violet rays. This will also raise the question whether Vita-glass will not be an advantage.

The trap has been used in Hertfordshire on a bracket on the rail of a balcony facing West, overlooking an orchard, with arable and pasture land beyond, and no near woods; by no means good collecting country. Having taken a month of spare time to evolve it, its trial trips were naturally of some interest. Its first two nights, Oct. 11th and 12th, 1931 were warm, with dense mist, to all appearances hopeless for "light" work. The first night there were over 30 specimens in the trap in the morning; the second, over 70; and although on both nights the species were common ones, it really seemed that we had "produced the goods." The third night yielded our first *Brachionycha sphinx*.

Full records have not been kept. The 70 probably still stands as the record for the trap. Most of the common "light" species have appeared, but nothing wildly exciting. The species that interested us most have been *Notodonta trepida*, *Taeniocampa populeti*, *T. opima*, *Plusia iota*, *P. pulchrina*, and *Acontia luctuosa*. The best night was one in June, when, lying in bed we could see three Hawk-moths, *Smerinthus populi*, *S. ocellatus*, and *Chaerocampa elpenor*, flying round the trap at the same time; they were all three in the trap the next morning.

Perhaps about half of the moths have been found in the dark chamber, and half in the light chamber, mostly in the drawer, but with a number up in the front corners of the glass, which meant taking out the panel to fetch them out. Some of the Geometrids simply sit on the outside of the glass.

This Autumn we have met with an unexpected trouble. Night after night, on turning in there have been moths in the trap, but in the morning there has been nothing but wings, all neatly severed near the base. The first time this happened was during the morning, after the trap had been left open (back door and panel both removed) to allow moths to escape, and obviously there had been a bird visitor, probably a robin, but possibly a fly-catcher. But subsequently this happened at night, or rather before the trap was visited in the morning. After exonerating spiders on account of the complete disappearance of the moth bodies, and earwigs and other insects as they did not hide in the moss put in the trap as cover for them, we are inclined to agree with the suggestion that the culprit must be a bat; but we have not caught him yet.

The Life History of *Isturgia carbonaria*, Clerck.

(Plate VII.)

By E. A. COCKAYNE, D.M., A.M., F.R.C.P., F.E.S.—Presented
November, 1932.

(With a description of the pupa by C. N. HAWKINS, F.E.S.)

The larva of this insect is not figured either by Buckler or Spuler, but Newman gives a description, which is copied by Barrett, and South's meagre account is probably derived from the same source. Newman's larvae were brown, but his brief description of the pattern agrees with that of mine, which were all green. He makes no mention of the conspicuous red colour on the anal prolegs and anal plate and says that the anal prolegs are of the same colour as the ventral surface. The red may however only be present on the green form of larva. Seitz also says the larva is brown, and I have found no mention of a green form in other books. Newman says the larva is found in June and July and feeds on birch and willow, especially *Salix cinerea*, and Barrett, Culot, and South all give these two food-plants, though South adds that *Vaccinium*, *Erica* and bearberry, (*Arctostaphylos uva-ursi*), have also been mentioned.

In 1905 I tried to breed it from the egg, but the larvae did not thrive on either of its reputed food-plants, and, though I felt sure from watching the females that bearberry was the usual food, I was unable to obtain a supply of it. This year, 1931, I had another opportunity of seeing the moth near Braemar and again noticed that although the males flew briskly all over the hill-tops from 11.30 to 1.30 (summer time), the females were either at rest on the large patches of bearberry or were disturbed from them only to fly a few yards and settle again. In all the five places where I have seen *carbonaria*, bearberry has been very common, growing at a comparatively low altitude, 1,100 to 1,400 feet, though a single female was found at over 2,000 feet in company with *Anarta melanopa*. In three of these localities there is neither birch nor willow, and my observations this year have strengthened my belief that *Arctostaphylos* is the natural food.

The eggs, long, oval, and flat, were laid singly on the stems and leaves of bearberry from June 15th onwards and the larvae hatched from July 1st to 7th, giving a period of sixteen days in the egg.

First instar. A short rather thick larva, slightly broader in front

Fig. 2.

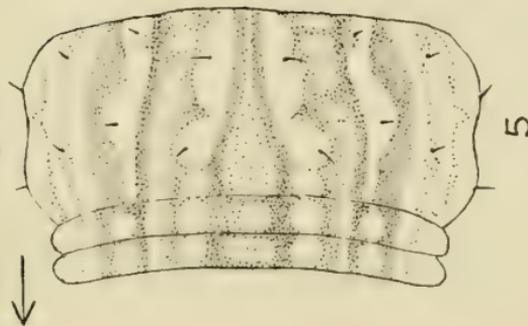


Fig. 1.



FIG. 1.—Last six somites of larva of *Isturgia carbonaria* in last instar (lateral view X 17). In somite 5 plain areas represent white, lightly dotted whitish green, and heavily dotted green. The very heavily dotted areas on the last three somites represent Vandyke red.

FIG. 2—Ventral surface of fifth abdominal somite of larva in last instar (X 17). Colour indicated as in fig. 1.

than behind. Head pale yellowish brown with irregular faint brown spots on the anterior aspect of the vertex and wavy broken lines on the lateral aspect. Ocelli black.

Thoracic plate pale yellowish brown, broad from side to side but very narrow in the long axis of the larva and slightly concave posteriorly. Thorax and abdomen pale yellow with five longitudinal wavy dark green or greenish-brown lines, one central and two on either side. Spiracles very small and ringed with black. Tubercles rather small with extremely short black setae. First ecdysis July 13th (first larva) and 19th (last larva).

Second instar. Still short and stout. Head subporrect, pale yellowish brown with darker markings as before near epicranial stem and frontovertical suture and on sides of vertex. Antennae pale straw colour. Six black ocelli. Prothorax, colour and shape unaltered, except that it is crossed by two dark brown lines dorsally and shows traces of two more on each side at the anterior margin between setae alpha and gamma. Thorax and abdomen pale yellow, becoming green after feeding. There are seven pairs of dark brown wavy longitudinal lines, each pair separated from the next by a slightly wider space than that between members of the same pair. There is a central pair, a pair on either side of it, and two other pairs between these and the spiracles, which are very small, almost circular, and white with a narrow black ring. I have called the pairs of lines, dorsal, subdorsal, and upper and lower supraspiracular.

Below the spiracle on each abdominal somite are two setae, anterior and posterior, below these again two more, anterior and posterior, and below these again two more, omega and pi, lying between a pair of wavy dark brown lines. The pair of dark brown lines on each side of the venter runs the whole length of thorax and abdomen. Tubercles very small and black with a very short black seta arising from each. Alpha lies on the inner subdorsal line and beta between it and the outer subdorsal line. Anal plate green with two pairs of longer stiff setae near the posterior margin. Prolegs short with black crochets.

Second ecdysis July 20th.

Third instar. 5mm. long. Nearly cylindrical, but broader anteriorly than posteriorly. Head subporrect, pale yellow-brown faintly mottled with darker brown. Ocelli black, six in number. Ground colour pale green with seven pairs of wavy longitudinal lines above the spiracles and two subventral pairs. Ground colour a little darker between lines belonging to the same pair than those belonging to different pairs, where it is whitish. On the second thoracic somite the lower line of the upper supraspiracular line is bent sharply downwards and both lines of the lower supraspiracular pair are bent in the same way so that the lower of the two reaches a point below the level of the prothoracic spiracle and then both

turn upwards a little and end before reaching the anterior part of the first thoracic somite. The spiracular line is broad and whitish and the ventral surface is paler green than the dorsal and has indistinct broken wavy longitudinal markings.

Prothoracic plate straw coloured and unchanged in shape, crossed by the dorsal pair of lines, but with subdorsal pair of each side only visible at the anterior margin.

Legs green. Tenth abdominal somite, except for a narrow transverse band across the anterior part and a narrow strip along the anterior three-quarters on each side, is vandyke red (Ridgway), and the posterior half of each anal proleg is of the same colour. Third ecdysis July 25th.

Fourth instar. 8mm. long. Head subporrect, olive-yellow (Ridgway), darker markings very faint, matte surface. Prothoracic plate as before in shape and markings, whitish-green. Shape cylindrical, rather broader in front, ground colour pale green between each pair of longitudinal stripes, whitish-green between the dorsal and the inner subdorsal stripe. There are seven pairs of dark green longitudinal stripes above the spiracles, representing the seven pairs of wavy lines of the second instar, and there are two subventral pairs. In the mid-abdominal region the outer supra-spiracular pair may unite in the posterior part of a somite. Spiracular line broad, whitish and broken by light green lines chiefly in the folds. General appearance darker above the spiracles than below where the ground colour is whitish with many pale green longitudinal lines. Skin smooth above spiracles, but wrinkled laterally. Anal plate and posterior half of anal prolegs with the same areas vandyke red as in last instar. Setae black, very short except for four slender lateral ones on each side of the thorax, two of which are on the prothorax, and four coarse ones along the posterior margin of the anal plate.

Fourth ecdysis August 2nd (first larva) and 5th and 6th (later ones).

Fifth instar. 14mm. long \times 2.25 wide before feeding and 17mm. long \times 3mm. wide when full-fed.

Head olive yellow (Ridgway), rough on microscopical examination so that to the naked eye it has a matte surface. Antennae, proximal segment green, distal tinged with pink; mandibles with green bases and apices tinged with pink, teeth dark brown. Labrum green with a pink tinge deepening to vandyke red along the lower border. Precoila vandyke red. Ocelli, six, dark brown, the sixth situated on under surface of lobe. In one larva the third ocellus was very small, the fourth green with a brown anterior border but of normal size, and the sixth very small.

Prothoracic plate very narrow from before backwards and with posterior margin slightly concave, whitish green, crossed by the dorsal pair of dark green stripes; in the majority two vandyke red

longitudinal lines run from the level of delta to that of gamma, the one, just internal to these setae, and the other, wider and curving inwards between the setae, start just internal to gamma and end just internal to delta. The larva increases in width from the head to the third thoracic somite, this and the first abdominal being the widest; it then tapers gradually to the seventh and then more rapidly to the tenth; the ninth is very short as well as narrow. On the dorsum above the spiracular line the pairs of wavy lines now form pairs of stripes uniformly coloured bice green (Ridgway), but the lower supraspiracular pairs on each side are almost completely fused into one broader stripe. The ground colour is now more clearly differentiated into alternate stripes of whitish green and white. The following is the pattern from mid-dorsum to mid-venter; a mid-dorsal whitish-green stripe, a green stripe (one of the dorsal pair), a white stripe, a green stripe with alpha in it (inner subdorsal), a greenish-white stripe with beta in it, a green stripe (outer subdorsal), a white stripe, a green stripe, (inner upper supraspiracular), a broader greenish-white stripe, a green stripe (outer upper supraspiracular), a white stripe, a broader green stripe partially divided by a narrow line of whitish green with rho in it (the two lower supraspiraculars partially fused), the broad white spiracular line forming a prominence containing the spiracle and eta and kappa with an undulating skin fold below, pale green in colour, another prominence coloured white and divided by an incomplete green line on which lie nu and mu, a green stripe, a white stripe containing omega and pi, a green stripe (the last two green stripes replacing the pair of wavy subventral lines of the second instar), an indistinct whitish stripe, a pure white stripe with tau and sigma near its outer margin, its posterior part nearer the mid-ventral line than its anterior, a green stripe, the yellowish-green mid-ventral stripe much narrower at the posterior than at the anterior end of each somite. Both dorsal and ventral surfaces are crossed transversely by narrow green lines along the divisions between the somites and the transverse skin folds. The white stripes of the dorsum and the inner three whitish green ones are of approximately equal width, until the fourth abdominal somite, where the whitish green ones widen and on the fifth abdominal become considerably wider than the white stripes.

The pattern and setal arrangement are modified on the thoracic and last two abdominal somites. On the prothorax the spiracular white line is represented by an oval white spot below and a little anterior to the spiracle, which is situated on the green ground colour, and by a whitish area around the pale green one occupied by nu and pi, the whole forming a prominence. Alpha, beta, gamma, and delta are all very short and black, but above and anterior to the spiracle is a short seta with a very long and very slender one, slightly below and in front of it, pointing forwards

and following the curve of the head, ? rho and epsilon respectively. In front and a little below the spiracle is another short seta and just below this a long slender one pointing ventrad and following the curve of the body, ? kappa and eta respectively. I can see no other prothoracic setae excepting those of the leg. The second thoracic has two short setae, alpha and beta, and in the same transverse line with them, above the spiracular line, is a short seta and just below and in front of it a long slender one pointing upwards and outwards, ? rho and epsilon. Below is the white spiracular line widening at the two prominences carrying the short anterior seta, kappa, and the posterior, theta. Just below the anterior part of the prominence is a smaller one, white at the periphery and green in the centre, from which arises the short seta, eta, a fairly wide and deep incision separates this small anterior prominence from a much longer white one, narrow in front and wider posteriorly, where it reaches the posterior margin of the somite. On the third thoracic somite alpha and beta lie at the junction of the anterior two-thirds and the posterior third, and more laterally in the same transverse line is a short seta, ? rho, and just external to it a long slender one pointing upwards and outwards, ? epsilon.

The spiracular line narrows abruptly opposite rho and epsilon and then widens again, becoming gradually narrower at the posterior end of the somite, and in the middle of the wide part is a small seta.

On the 7th and 8th abdominals the greenish white ground between the two dorsal stripes is divided by much wider transverse bands at the creases than in the preceding somites. On the 8th abdominal the white spiracular line is divided by an incision running obliquely upwards and backwards opposite the spiracle, which lies above it. The prominence above and in front of the incision is roughly dumbbell shaped, the anterior part beginning at the anterior end of the somite is the wider and contains the short seta, eta, lying below and in front of the spiracle, and the posterior part is narrower and does not reach the posterior end of the somite. It contains the short seta, mu, lying opposite the gap between the spiracle and kappa. On the 9th abdominal the dorsal and the inner subdorsal stripes converge and do not reach the posterior border of the somite, which is green. The other green stripes diverge and do reach the posterior border. Each of the four short setae near its posterior margin rises from a short transverse vandyke red line. In one larva however each of these setae rises from a longer red line, and each of the beta setae of the 8th abdominal rises from a short red line and those of the 7th from a red dot. The vandyke red anal plate sprinkled with small green dots in its central part is very conspicuous. The part of the 10th abdominal anterior to it forms a narrow whitish green band crossed by a longitudinal green stripe in the mid-line with another on each side, the latter converging and joining it at the

anterior border of the red plate. Two green lines running obliquely inwards also cross it and reach the red plate near its outer border.

There is a green border to the anal flap extending along its anterior half, but the whole of the rest is red. The anterior dorsal pair of setae, alpha, and the anterior lateral pair, rho, are short, but a little longer than those on the preceding somites. The two pairs of setae situated near the posterior margin of the flap, beta and kappa, are much longer, very stiff, and curved slightly upwards, beta being a little longer than kappa. The conical elevation on the posterior aspect of each anal proleg, which protects the anus, is red and has a similar long stiff seta. The red colour also extends on to the posterior two-thirds of the anal proleg in the shape of a triangle, which does not reach the fleshy distal end. On the red part of the proleg, in line with the posterior seta, a line of pale green dots curving like a reversed S starts at the base of the proleg and runs nearly as far as the seta, and near the anterior margin of the red area a short green stripe starts at the base of the proleg, and then two roughly parallel lines of pale green dots, rather irregular in size and shape, run nearly to its apex. In some larvae there is a vandyke-red patch on the outer aspect of the first proleg. The legs are green with pink claws and the crochets of both pairs of prolegs are vandyke-red.

Like the head the skin is completely covered with microscopic raised dots giving it a dull surface. Both blood and fat are deep green, and the testes are deep orange in colour.

Date of pupation. The largest larva was preserved on August 10th and would probably have gone into the earth the next day. The last three were full-fed on August 13th and 14th, two entering the earth and one remaining on the surface. This pupated on August 16th, after a larval life of forty-one days.

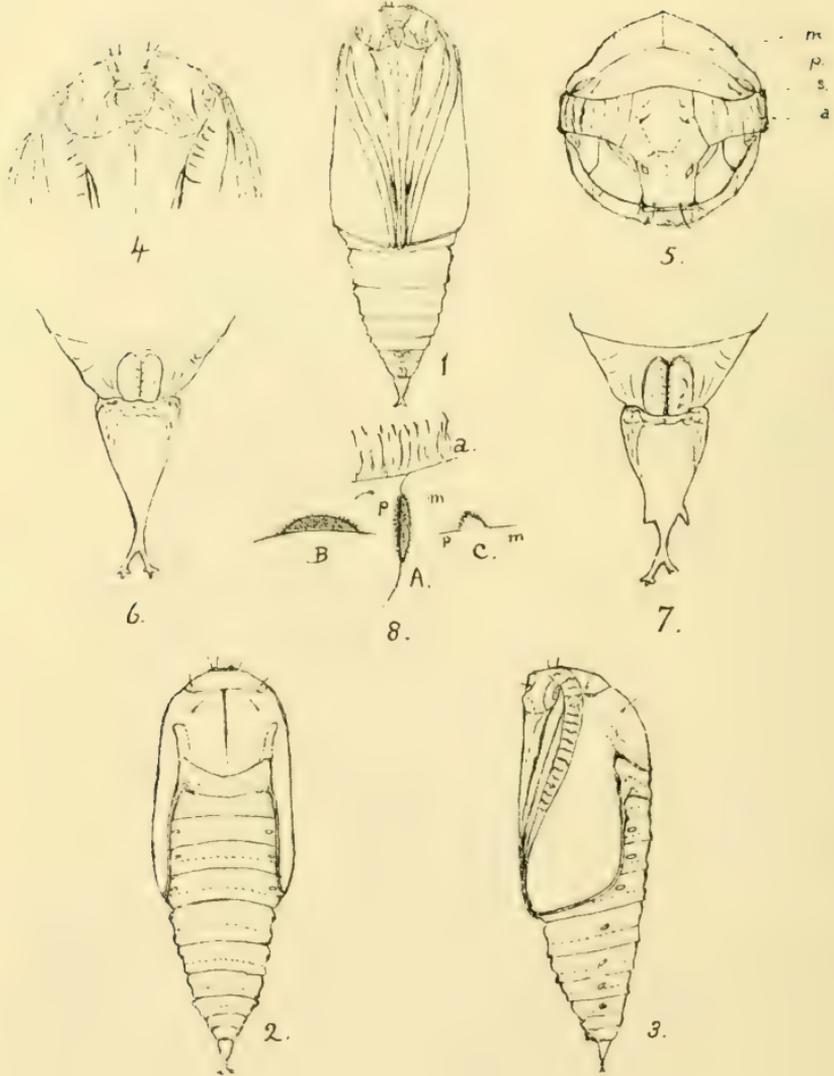
HABITS.

From the date of hatching until full growth was attained and they descended into the earth the larvae never used a silk thread, and throughout their lives they were very sluggish. When disturbed they fell off the food-plant and remained fully extended or in a U-shaped loop with the head just in front of the first pair of prolegs, but in the last two instars the latter position was almost invariably adopted. They would remain thus for ten to fifteen minutes and were loth to take hold of a leaf when moved on to fresh food. The newly hatched larvae were placed in a glass-topped tin with a piece of bearberry and soon began to eat the edges of the youngest leaves and buds, and even when nearly full grown they never ate any but this year's leaves. Unfortunately the frass is sticky and the little larvae soon became covered with it and, as it got mouldy, they failed to change skin successfully and nearly all died. The frass stuck so tightly that it could not be removed with

a brush. Only fourteen reached the second instar. In a deep glass bowl a small vessel of water was placed with a piece of cardboard resting on it and fitting closely to the sides of the bowl. The sprays of bearberry were put into the water through a small hole in the cardboard and the top of the bowl was covered with a handkerchief. The food was changed once a week, but would have kept fresh for a fortnight. The larvae thrived under these conditions and no more died, and they could be watched without disturbance. They rested on the sides of the leaves or on the stems and often fed by day, though fully exposed to the light. At first they ate pieces out of the sides of the leaves but later on ate some of the youngest leaves entirely and often dropped large pieces of others on to the cardboard.

When moving the abdomen is curved but the thorax is held horizontally and with it the larva makes curious quick jerky movements from side to side between almost every step.

I am much indebted to Mr. William Hales for allowing me to take sprays of bearberry from time to time from the Chelsea Physic Garden.



EXPLANATION OF PLATE VIII.

ISTURGIA (FIDONIA) CARBONARIA, CLERCK.

1. Ventral aspect of Pupa. ♂ × 5.
 2. Dorsal ,, ,, ,,
 3. Lateral ,, ,, ,,
 4. Anterior portion of Pupa, Ventral aspect × 10.
 5. ,, ,, Front aspect (diagrammatic) × 10 approx.
 6. Cremaster. Ventral aspect × 25.
 7. ,, (another example) × 25.
 8. Cover of Prothoracic spiracle—
 - A. From above. B. From before.
 - C. Cross section × 25.
- a.* Antenna. *p.* Prothorax. *m.* Mesothorax. *s.* Spiracle.

The Pupa of *Isturgia (Fidonia) carbonaria*, Clerck.
(With drawings; Plate VIII.)

By C. N. HAWKINS, F.E.S.—Presented November 1932.

The following description, and the drawings which accompany it, (See Plate VIII.) were made from two living pupae bred by Dr. E. A. Cockayne from ova laid on June 18th 1931 by a female captured at Braemar, Scotland. Both pupae are of the male sex, which is perhaps a little unfortunate but at the same time this fact prevents any suspicion that certain differences in the measurements, and of shape in the cremaster, might be due to sex.

One pupa, which I shall call "No. 1" is somewhat larger than the other ("No. 2") and I think it probable, for reasons mentioned later, that the latter is slightly abnormal. The description, therefore, and the drawings, with the exception of Figure 7, have been made from No. 1 but I shall indicate where No. 2 differs in any important point. The following are the principal measurements:—

| | <i>Pupa No. 1.</i> | <i>Pupa No. 2.</i> |
|--|--------------------|--------------------|
| Length (including cremaster and hooks). | 9·0mm. | 8·5mm. full. |
| „ to end of maxillae. | 5·75mm. | 5·5mm. |
| „ „ „ „ 1st tarsi. | 4·25mm. | 4·0mm. |
| „ „ „ „ 2nd „ | 5·5mm. | 5·0mm. full. |
| Width at shoulders. | 2·75mm. | 2·75mm. |
| „ „ 3rd abdominal. | 3·0mm. full. | 3·0mm. |
| „ „ 5th „ | 2·5mm. | 2·5mm. |
| Thickness (dorso-ventral) at posterior margin of meso-thorax | 2·75mm. | 2·7mm. |
| Thickness at 3rd. abdominal. | 2·8mm. | 2·8mm. bare. |
| „ „ 5th „ | 2·125mm. | 2·0mm. full. |

It will be noted that pupa No. 2 is slightly shorter than, but nearly as stout as, pupa No. 1. The dorsum of No. 2 is slightly more curved longitudinally and the whole surface is more wrinkled and dull looking and it has grains of earth adhering to it in several places. These facts lead me to believe that pupa No. 2 is a little deformed and abnormal.

With regard to the total length measurement these pupae vary slightly from time to time according to whether they are stretched out to their full length or not. If touched they often contract slightly, and they appear to do so also more or less permanently as

time goes on. The measurements given under this head therefore must be taken as maxima. In colour the pupa, except for those portions mentioned hereafter, is very dark brown, nearly black.

Those parts of abdominal somites 4, 5 and 6, posterior to the dotted lines in my Figures 1, 2 and 3, on the Plate are of a moderately light, yellowish brown colour, becoming considerably darker, however, towards the junction with the next following somite. With regard to the dotted lines already mentioned, I shall refer to, and explain them later, but in the meantime it must be understood they do not represent actual lines on the pupa. They do however indicate on these somites, approximately the division between the dark and light portions. I say approximately because actually the colours, though quite distinct, are not sharply divided but shade off from the dark to the light more or less abruptly.

The cremaster and its spines or hooks are of a rich dark red colour. The surface of the raised cover of each prothoracic spiracle (Figure 8) is covered with a dense pile of short, stout, transparent looking pale coloured hairs or spines, which give it the appearance of being greyish white slightly tinged with yellow. The other visible and effective spiracles have narrow slit-like openings in their centres which are however well hidden by the much raised rims. These rims are higher on the anterior border than elsewhere so that the external openings of the spiracles are directed slightly backward.

The surface of the pupa has a moderately polished appearance although it is far from being actually smooth.

The exposed portions of the abdominal somites (except the light coloured portions of 4, 5 and 6) are covered with widely spaced, coarse pitting while between the pits the surface is slightly and irregularly roughened but not sufficiently so to destroy the polished appearance to the naked eye. I have already said that No. 2 looks rougher than No. 1. The lighter portions of abdominal somites 4, 5, and 6 are covered with extremely fine, close, and regular pitting arranged, more particularly on the dorsum, in close successive rows transversely to the long axis of the pupa. This fine pitting becomes a little less fine and regular in the darker posterior portion of the light area. In the case of the coarse pitting, the pits are roughly circular but in the fine pitting the pits are more or less oval with their long axes placed transversely to the long axis of the pupa and the appearance of the successive rows is somewhat that of a net which has been stretched in one direction. The two forms of sculpture overlap slightly so that an occasional coarse pit may be found in the area of the fine pitting. The meta-thorax is sculptured on the surface with strong rugae radiating fan-wise from the posterior margin of the meso-thorax, with a raised, moderately smooth, median ridge dividing the two sides. This ridge forms a median forward extension of the raised posterior margin of the somite.

The meso-thorax is far less heavily marked, the sculpture consisting of coarse, but weak, transverse striae divided in the middle line of the dorsum by a ridge and becoming broken up and wavy towards the lateral margins. Towards the anterior and posterior margins the sculpturing becomes much stronger and many of the striae curve round and run into the margin while some bend back towards the middle line again so that they form a succession of loops.

The pro-thoracic sculpturing consists of moderately strong rugae radiating irregularly outward and backward from a very faintly indicated median line; or, starting from the anterior margin, following the same general trend outward and backward to the lateral margins of the segment.

All margins of the thoracic segments are very slightly raised. Wing nervures are ill-defined and in some parts, particularly in the central area of the wing, have an appearance of being smoothed over. The wing surface is slightly roughened but moderately shiny.

The inner margins and nearly half the length of the outer margins of the hind wings are visible beyond the corresponding margins of the fore wings.

The segmentation of the antennae is well indicated and each segment usually has a small furrow or stria across the middle. The edges of the antennae are considerably raised so that, contrary to the usual formation, the central portion is transversely concave for nearly the whole of its length, becoming more flat towards the tip and convex near the head.

The meso-thoracic legs are strongly striated transversely and also have raised edges and concave median areas.

The pro-thoracic legs, with the exception, in each case, of a smooth protuberance in the upper portion, and a nearly smooth median area, are also transversely striate but the edges are not much raised and the median areas are transversely convex.

The head, and more particularly the front, is also covered with fairly strong rugae which do not seem to follow any definite pattern, but amongst them are certain furrows, shewn as dotted lines in Fig. 5, which may indicate the lines of lost sutures including a fronto-clypeal suture.

There is no dorsal head-piece.

The openings for the invaginations of the anterior arms of the tentorium must be extremely small, but I am unable to identify them with any certainty owing in part to the wrinkling of the pupal surface. There are three transverse striae or furrows at about the junction of the clypeus and labrum (See Fig. 4) and no doubt one of these indicates a lost clypeo-labral suture but in appearance they have the effect of dividing up this portion of the surface into two transverse plates, the larger of the two (that next the labrum) having towards its ends small raised lumps or knobs. Each upper

corner of the clypeus bears a curious eye-shaped mark and a somewhat similarly shaped protuberance occurs on each mandibular area near its upper angle (See Figs. 5 and 4).

Labial palpi are just visible as a minute triangular area immediately below the labrum. There are no maxillary palpi. The thorax and head parts bear setae as indicated in the figures but there are setae on the abdomen also which, however, I have not shewn, because, although some of the latter are quite clear and appear to be placed as usual in Geometrid pupae, others are very difficult to distinguish. They are also very easily broken and rubbed off so that I am not certain whether they are present or not, *e.g.* I can see no anterior trapezoidals except on abdominal segment 1, but this may be accidental. Having regard to the very small quantity of material available it seems best not to attempt to deal with these at present.

The maxillae appear to be pushed out into a kind of low, flattened keel for a short distance near their bases, presumably by the underlying mouth parts and labial palpi, as indicated by the dotted lines in Figs. 1 and 4. The remaining portion of each maxilla is slightly concave transversely.

The meta-thorax and each abdominal somite from the 1st to the 8th inclusive has a depressed area in the situation shown by the dotted lines on Figs. 1, 2 and 3, transverse to the long axis of the pupa and, where so far visible, forming a complete ring around the body. Each of these somites therefore has a raised convex anterior portion, followed by a concave part, this again being followed by a raised posterior part which is flatly convex and which partly overlaps the next following somite. As I said before, these dotted lines on the abdominal somites do not represent actual lines on the pupa. They are intended to indicate the situation of the concave rings.

The cremaster (Fig. 6) is large, strong, bifurcate and each fork ends in three short teeth placed nearly in the lateral plane of the pupa although there is a slight tendency to a radial arrangement. Fig. 7 shews the (probably abnormal) cremaster of pupa No. 2. With the exception of the base and a part of each side, which are wrinkled, the surface of the cremaster is smooth and polished. Under the microscope and by transmitted light it appears to be hollow and unoccupied down to the point where it narrows above the bifurcation. The forks themselves appear to be solid.

I am afraid this is a very inadequate description, but some, at least, of the deficiencies, can, I hope, be filled in from the drawings.

ANNUAL ADDRESS TO THE MEMBERS
 OF THE
 South London Entomological and Natural History
 Society.

Read January 26th, 1933.

By T. H. L. GROSVENOR, F.E.S.

LADIES and GENTLEMEN. For the third time it falls to my lot to read the annual Presidential Address. In doing this for the Diamond Jubilee of the Society, one's thoughts must go back to one of the original members, to whom we had hoped to listen this evening, but this was not fated, as Mr. Step passed away from us just before he was to have presided, so I feel this evening I am occupying the position of a stop-gap.

It is a pleasure to one who has the interests of the Society at heart, to have heard the encouraging report from the secretaries. The membership, a very important item in our welfare, has increased. And our Treasurer has shown that the finances are in a satisfactory condition, so that in a year of world wide depression, it is encouraging to hear a report that is not a tale of woe, and the fact that our officers can report progress in such a year, must surely speak volumes for the healthy state of the Society. This condition of affairs can only be brought about by the enthusiasm of the members, and that this exists is shown by the greater number of exhibits, a pleasing feature of these being that many of them have been by the younger members. Furthermore, we hear that the field meetings have had a better attendance, but we will not make much comment on this as the better weather of 1932 may have helped. We have had a considerable number of donations to the Society's collections, and these are now becoming a very valuable asset. That it is appreciated by the members is shown by the fact that on every meeting evening there are always a number of members studying the series. Without wishing to make distinction, we must

congratulate the Curator for restoring order ; this has been no light work, when one considers the large addition to cabinet space, and the great number of specimens added during the past few years. It is satisfactory also to note that the British Museum Authorities have given sympathetic consideration to an application for duplicates to add to our series of micro-lepidoptera, and one feels that when this is carried into effect, the South London Society will be in possession of a representative collection of British and Continental insects of all orders, and one that will continue to increase in value to the members for the purpose of reference and study.

The deaths of four members have occurred during this year. Of these two were entomologists of wide reputation. Richard South died on March 28th at the age of 85. He was well known to the older members as he was formerly a regular attendant at our meetings and had been twice President of the Society (1885 and 1896). To the younger generation of entomologists his name is familiar as the author of "The Butterflies and Moths of the British Isles" and for many years Editor in chief of the "Entomologist."

J. J. Joicey died on March 10th at the age of 61. He was not so well known to our members as he rarely attended the meetings, but doubtless many will remember his very extensive exhibits on one or two special exhibition evenings. He made during his life very wide purchases of large collections, particularly exotic. He it was who sent the Platts out to New Guinea where they discovered many species of lepidoptera new to science, especially in the genus *Delias*, which in conjunction with Mr. G. Talbot formed the basis of a monograph of the Genus. He also sent the late T. A. Barns to little known parts of Africa.

J. E. A. Colby died on January 20th. Though keenly interested in some of the more general aspects of our studies he seldom attended our meetings. He joined the Society only in 1930.

Dr. Randall Parkes, one of the younger members, died early in the year. He was an earnest student of the Lepidoptera so far as his limited leisure permitted.

One of the privileges (or otherwise), attaching to the office of President, is that on the fourth Thursday in January, he has to deliver an Address, whether he has material ready or not, and to one limited as I am, it is not an easy matter to prepare one. Thus once more I must inflict on you something connected with the

genus *Zygaena*. It is perhaps hardly cricket to deal with a controversial subject on a privileged occasion, and one on which criticism is taboo, so all I can offer is that those who do not agree with what I am going to say will utilize the next fortnight whetting beak and claws to rend me asunder. What I shall read this evening is not given in a dogmatic spirit, and probably many of you will heartily disagree with what I have to say.

During the past ten or twelve years I have bred many thousands of "burnets," and for various reasons these have been practically confined to the 5- and 6-spot species found in England, although much of the material has been obtained from various parts of the Continent. The great majority of these were *filipendulae*, *stoechadis*, *trifolii*, *lonicerae*, and the new and long overlooked *clorinda*, all of which are found at low levels, and all are very closely allied, so that it has often occurred to me that the whole of this group, must have had a common origin. I shall say nothing about *angelicae* and its regular local 6-spotted form *vatisbonensis*, as I have had no experience with this species. *Laphria* and *ramburii*, I have never even seen.

Do the *Zygaenas* migrate? To this question I would answer yes. From closely watching the habits of *filipendulae* and *trifolii*, I have observed that this is done annually, and although not spectacular as in the case of certain butterflies, yet the movement is more methodical, inasmuch as it would seem to be caused by necessity. As is well known the different species of *Zygaena* are very local. In several stations I know two colonies are separated by a few hundred yards and these may or may not meet, this depending on food supply; if the intervening country does not provide the necessary food they will migrate in the direction of the greatest food supply. The reason for this migration is definitely due to this food supply; as the larvae are sluggish and also eat a considerable amount, and furthermore may be in the greatest abundance, therefore the foodplant, *Lotus corniculatus*, suffers considerably. From experiments made it takes a plant several years to recover after feeding a few larvae, and furthermore as the larvae prefer the young shoots, the plants are rendered incapable of seeding and replacing those worn out, so that a piece of country may be temporarily denuded of the foodplant to such an extent that in the following season one of two things may happen, either the species is very scarce, or the colony will move a short distance away. It has often been noted that colonies in one year of extreme abundance are

followed by the greatest scarcity, the cause of this being generally ascribed to parasites: these of course may reduce the numbers somewhat, but it would seem that the food supply is the prime factor in regulating numbers. In the case of *trifolii*, about ten or twelve years ago this species was in the greatest abundance in Picketts Hole, and to get beyond a few odd specimens one had to walk to the Rifle Ranges; during the next year or two it had left its habitat at the foot of the hill and was fairly abundant higher up. Here a thick hedge divided the slope of the hill, but the movement continued in a northerly direction until the hedge had thinned out when it continued east, until about three years ago the species was in the greatest profusion on the slope north of the drive, about $\frac{3}{4}$ mile from the Range. Further observation of the migration was stopped owing to fire, but last year there was a colony forming on the slope south of the drive, quite near to Dorking Station. A visit to Picketts Hole in 1932 failed to produce a single specimen.

I will now give an instance of a colony dying out through inability to migrate in any direction. On Wray Common, Redhill, there used to be a small colony of *jilipendulae* which existed for several years, although I cannot find any record of its occurrence there before 1914. About 5 years ago this became a very flourishing colony, and the ground was almost covered with *Lotus*. It was quite a small piece of ground bounded on the North by a playing field and grazing land and by a road: on the South by a field without food plant; on the East by a road, house and garden; and on the West by a wood. It will thus be seen that the colony was entirely hemmed in and incapable of migration, and it is now quite extinct.

I have dealt with these instances of limited migration and mortality at some length as it is essential to the theory of a possible migration in ages past, probably at the close of the last Glacial Period. This migration has followed very definite lines, the 6-spotted forms having moved in a North-westerly direction, and the 5-spotted forms in a South-westerly direction. The genus is confined to the Palaearctic region. In Northern Africa the Burnets are limited to that part bordering on the Mediterranean and bounded on the south by the Atlas and Aures Mountains, and it would seem that these ranges have acted as barriers thus preventing the species from penetrating further south. Omitting other groups which possibly fall into line with one another, as I have had no opportunity

of observing them, I must perforce say nothing about them. All the species in Northern Africa are 5-spotted and are composed of very highly specialized races of *trifolii* and *lonicerae*. This tract of country across North Africa we will call the southern belt. North of the Mediterranean there is a tract of country, the central belt, embracing Spain, South of France, Italy and eastward where 5- and 6-spot species are all mixed up and comprise *trifolii*, *lonicerae*, *stoechadis*, *filipendulae* and *clorinda*. In this Central Zone *stoechadis* regularly produces indiscriminately 5- and 6-spotted forms and 6-spotted *lonicerae* and *trifolii* are not unknown, and in Spain Dr. Verity reports the possibility of a race of *lonicerae* regularly producing a 6-spotted form.

In the extreme eastern part of their range *lonicerae*, *trifolii*, and *filipendulae* occur as far as Amurland, while westwards they range as far as Ireland, the 5-spotted forms being most abundant in the Central belt, becoming rarer as they spread north, and it would seem that south Sweden is the farthest north, where they are found rarely up to 60° north latitude, whereas *filipendulae* extends to well within the Arctic Circle, but does not extend to the Southern Belt. It would seem that *exulans* is also included in this migratory system, but I should not like to suggest a common origin with the species under consideration, although it is within the bounds of possibility that in the vast period of time that has elapsed since the close of the Glacial Period, they, by reason of their preference for an alpine habitat, have evolved a form suitable to the colder climate. Another possibility is that *exulans* is a more primitive form evolved in the more temperate arctic regions at the early part of the Glacial Period, and then migrated westward wherever an Alpine flora existed, which at this period of the earth's history would be at sea level or at a very low altitude. That *exulans* is an arctic, not a truly alpine species, is shown by the fact, that it is found to-day at sea level in Arctic Lapland, and is probably one of the most northern of the Lepidoptera. It therefore seems that during the time it took to spread to as far West as Scotland, there must have been arctic conditions prevailing, and when taken by surprise by the area of glaciation receding, the species had to migrate higher up the mountains which sustained an alpine flora, and so to-day we find *exulans* dotted about all over Europe, wherever there is suitable food, which is composed of *Empetrum*, *Vaccinium*, *Loiseleuria* and probably any other plant that may offer, in a region where plant life is beginning to be limited. Another argument that may be

used for the assumption that *exulans* is Arctic rather than Alpine, is this omnivorous tendency in the larva; in captivity it will readily eat *Lotus*, *Hippocrepis* and other leguminous plants. If it were an alpine species it would in all probability spread in the direction of lower altitudes.

Exulans, however, is a digression, and is only mentioned here as it is a definite 5-spotted form, and although it is a matter of impossibility to see through the mists of a vast antiquity, it has always seemed a possibility that this or some very similar insect may have been the original parent of the 5- and 6-spotted forms, and has now assumed a very different facies from the original form by reason of its still retaining a similar habitat, whereas *loniceræ*, *trifolii*, *jilipendulæ*, etc., having migrated along the warm valleys have now evolved in a different manner. Although now structurally different they are still very closely allied, so much so that hybridisation is possible between the various species; fertile ova have been obtained from pairings, *jilipendulæ* × *trifolii*, *jilipendulæ* × *loniceræ*, and far more commonly between *trifolii* × *loniceræ*, but a number of records of this hybrid pairing must be looked on with doubt, as many entomologists find considerable difficulty in separating these two species; in fact a race of *loniceræ* from Tring has absolutely beaten me, although I thought myself capable of differentiating them. In *loniceræ* confluent spots are rare, and this is one of the first things to look for as the two central spots almost without exception are separated, whereas in *trifolii* the reverse is the case. In this race from Tring about 50% were separated and 50% joined. This possibility of hybridization, although difficult to prove in nature, remains, as on one occasion I found a pairing of *trifolii* × *jilipendulæ*, from which I bred imagines, but it would have been a matter of impossibility to detect that these imagines were hybrids had they been taken wild as they produced indiscriminately 5- or 6-spotted forms exactly resembling either parent.

We have already seen that in the central belt we have a race of *jilipendulæ*, viz. *stoechadis*, regularly producing 5- and 6-spotted forms in equal numbers, whereas north and south of this narrow belt only a few miles wide, certainly not more than 50, this production of 6 spots in a 5-spot species, or 5 spots in a 6-spotted form, is practically unknown. This is not only confined to *stoechadis* as in the South of France and Italy; *transalpina* just as regularly produces 5- and 6-spotted forms in the central belt,

whereas in the northern belt *transalpina* is as regularly 6-spotted as *filipendulae*. I have already mentioned that in the south of Austria, *angelicae*, a definitely 5-spotted species, has a regularly 6-spotted form although it would seem that the case here is rather different as apparently from the little information I have the latter is only a local race, and it would seem to breed true. The same may be said of *transalpina*, although this character is not so marked, as in certain areas 5-spot forms only are produced, in others 6-spot only, and in others 5- and 6-spot, behaviour which agrees with that of *stoechadis* in the same belt.

Not being a geologist, I can only state what I have read as to the possible formation of Europe at the maximum of the fourth Glacial Period, and this, if I am correct, would seem to be a guiding line for the migration. Spain was probably joined to Northern Africa, and Italy also. The Mediterranean was then two lakes; the eastern end occupying much the same position as it does to-day, the Caspian and Black Seas being united. In the north the glaciation extended as far south as the Thames, across Belgium, Switzerland, Germany and across Russia. This roughly limits the area occupied by the central zone where to-day both 5- and 6-spotted forms are found. Thus if we look for the ancestral form somewhere in Central or Eastern Asia, the line of migration is across Asia Minor and Southern Europe. The tendency for the 6-spotted forms to be northerly has allowed them to extend northwards following the receding of the ice. Thus Ireland being joined to Europe the species would be able to extend as far as that country, and this has actually happened, as the Burnets are found right up to the west coast of Ireland. It may be objected that it would be impossible for the species to migrate across the deserts of Central Asia, but it would seem that this objection is not a strong one, as the early eastern civilisations were not likely to have been founded on arid wastes, and where tracts of desert appear to-day may well have been fertile country at the conclusion of the ice age. The receding of the great glaciers may have caused a lack of rainfall, and brought about the great tract of desert. Thus it would be possible for an interval to have occurred sufficient to allow the migration to have passed before the restriction of rainfall changed the flora of the districts, thus causing the species to die out for lack of suitable environment. In another group of *Zygæna*, principally from North Africa and Spain, an effort has apparently been made to evolve a desert race, this being the *Eryngium* feeders, which are characteristic of Northern Africa,

and include such species as *faronia*, *thervestis*, etc. It would seem that the genus is a very primitive one, and has evolved only to a slight degree in the passing of ages, and it is possible the original was a 5-spotted form, the arrangement of the spots in both 5- and 6-spotted forms are almost identical, the latter having a sixth spot. That this has been more recently evolved may be deduced from the fact that the first sign of wear in *filipendulae* is always spot 6, and it is by no means rare to see fairly fresh specimens of *filipendulae* with the 6th spot so worn, that where *trifolii* and *filipendulae* fly together it is occasionally a difficult matter to differentiate the species. I have on several occasions had pairings of *filipendulae* brought to me under the impression that cross pairings had been found, and only by the closest examination has it been determined that they were both the same species. The evanescence of this sixth spot in localities where no 5-spotted forms occur, as in England, and also when one has to deal with material from the central zone, where it is always this sixth spot which causes confusion, would seem to lead to the supposition that the presence of this spot is a lately acquired characteristic.

At a recent meeting one of our members asked the question, What is a species? To this I would say that in the genus *Zygaena* it is a very difficult question to answer, as possibly some of the forms existing to-day are good species, and others masquerading as species are probably only races. To give one or two examples, what entomologist, shown for the first time a series of *ephiates*, would say that there was only one species represented, when one form is a black and white insect, and the next a *filipendulae*-like form. Or again in the recently discovered *clorinda*, who would doubt that this was anything but *trifolii*? and yet, although in many respects, it is very close to that species, Dr. Hewer has shown that the female genitalia are very different. It has also been shown that the larva more closely resembles *filipendulae*, and that the species refuses to copulate with *trifolii*, *lonicerae* or *filipendulae*. Although one cannot see eye to eye with those who would give a multiplicity of names to races which could not possibly be differentiated if the locality labels were missing, one must admit that the races of *filipendulae* and *stoechadis* as named by Dr. Verity, when viewed in groups, certainly show a different facies, whereas if these groups were mixed together they would be quite impossible to sort out again. In a lesser degree this is the same in England, where every colony has its own characteristic either in tone of colour, size,

etc. In some colonies the red has a pinkish tinge in others a yellower or duller tone.

The distribution of some of the species is very puzzling; for instance, there is, at Gavarnie in the Pyrenees, a very local species *anthyllidis*, which is only found in one other locality in the whole of the Palearctic region, and this is the Caucasus mountains, hundreds of miles away. Another instance is that of *laeta* which from Austria eastward to Asia Minor is a common species; in Spain there is an almost identical species, viz. *ignifera*; but so little is known about this that it may be specifically entirely different. For that matter the same remark might apply to *anthyllidis*, although here it would seem that we have some grounds for believing that we are dealing with but one species. It must always be remembered that there may be far more apparent dissimilarity between races of a species, than between distinct species.

In conclusion my opinion is that migration and evolution are very closely connected in this genus, and that to-day we have an instance of evolution going on, as it has done for ages past with a very primitive form, or one that has only advanced very slowly from the original form. According to the tenets of the Buddhist faith, doubtless the "burnets" are acquiring merit and rising to a higher plane, and if in a future reincarnation we could see the genus *Zygaena*, unless they should be eradicated by the advance of civilization, we should see what are now only local races, advanced to the rank of species. If this is so, all that can be said is to repeat the question, What is a species?

Before bringing this address to a close, I have the pleasant duty of introducing the new President, not that this is necessary as Mr. de Worms is well known to all of us as one of the most regular attendants at our meetings, and if he receives the kindness from all the members that I have experienced during the past 12 months, a year to-day he will look back on 1933 as a very pleasant period of his life.

Ladies and Gentlemen, I thank you for all the kindness and consideration you have shown me during my year of office.

ABSTRACT OF PROCEEDINGS.

FEBRUARY 11th, 1932.

Mr. T. H. L. GROSVENOR, F.E.S., PRESIDENT, in the Chair.

Mr. W. L. Rudland, of Reading, was elected a member.

Dr. Williams exhibited a very variable series of *Erannis defoliaria* and another of *Hadena pisi*, and pointed out that the latter from Barnes Common and from Scotland were extremely variegated, while the Lancashire specimens were very plain and uniform in coloration and marking.

Mr. S. N. Jacobs exhibited larvae of *Myelois cribrella* (*cribrum*) taken hibernating in the stems of the Bull Thistle. The larvae apparently do not confine themselves to one stem for there is an entrance hole above the larval burrow. The larva lies head downwards in a small chamber lined with frass and silk. From Bromley, Kent, 8.ii.32.

Dr. Bull exhibited specimens of *Arctia caja* bred in December and January, emerging from 34-39 days after commencing their cocoon web; kept indoors but not forced.

Mr. Buckstone exhibited specimens of malformation in bred examples of *Pyrameis atalanta*; in a batch of 48 no less than 14 were with deformed wings; they were late in the year in emerging, the last appearing on November 25th. Mr. Newman reported a similar experience. A discussion took place on the occurrence of misshapen specimens. Mr. Newman had taken over 3000 larvae of *P. atalanta* at Folkestone from August to October and those last taken in October only a few weeks old were all parasitised. In the September emergences there were no malformations; later on malformation occurred increasingly; and the last to emerge in November were practically all malformed. It was suggested that in late emergences in many species there were more or less malformed specimens, *Vanessa io*, *Aglais urticae*, *Zygaena* spp, *Z. trifolii* in particular, *P. cardui*, etc. Temperature might be a factor in the

cause, or in the case of *P. cardui*, malformation might be caused by pressure on the chrysalis in the drying up of the thistle foliage.

The remainder of the evening was spent in the exhibition of lantern slides by members. Mr. Tonge exhibited the ova of British butterflies, Mr. Wall studies of flowers, Mr. Bunnett, numerous plants and insects. Mr. Newman and Mr. Dennis also exhibited slides.

FEBRUARY 25th, 1932.

The PRESIDENT in the Chair.

The decease of a member, Dr. Randall Parkes, was announced.

Dr. Williams exhibited a short series of *Hipparchia semele* to illustrate local variation, viz.

A. Surrey, 1931, very dark ♂♂. ♀♀ with pale yellow ground colour to forewings. Heath form.

B. Monkstown, Co. Cork, 1931, hindwings bright fulvous in both sexes, the forewings also more fulvous than in English specimens.

C. Co. Down, 1918, rather similar, but less richly coloured; taken on coast sandhills.

D. Swanage, 1920. Chalk form.

He also showed the galls of the Clearwing Moth, *Synanthedon flaviventris*, from a Surrey locality.

Mr. Buckstone exhibited the *quadripunctata* form of *Euchloë cardamines*, which form he had found recently much commoner than ever before, averaging one in about every twenty examined; also dark forms of *Lycia hispidaria* from Wimbledon Common, a species he had found for some years past to be severely ichneumonated.

Mr. Howarth exhibited a larva of *Cossus ligniperda* nearly full fed, from Brandon, Suffolk.

Mr. Hugh Main exhibited living examples of millepedes and centipedes to illustrate his remarks on the life-histories of the creatures. Millepedes fed readily on potatoes, and were often to be found under old logs lying in a damp situation in Epping Forest. Drought was fatal to all the species. *Polydesmus complanatus* occurred commonly in Epping Forest and in the speaker's garden under pieces of wood. *Polydesmus polydesmoides* also might generally be found. On the continent a large species somewhat common was *Scolopendra cingulata* three and a half inches in length.

In a species *S. morsitans*, occurring in Southern Europe, he had found as many as 5 dipterous parasites in one example. *S. morsitans* might be observed mothering its ova. In the discussion which took place after Mr. Main's slides were shown on the screen it was noted that millepedes often abounded just after rain. They were supposed to feed extensively on the tender young root tips of plants. Several members spoke of the abundance of millepedes met with in S. Europe and Asia, and especially India. Mr. Main said that they came out at dusk in large numbers, probably for pairing. He had seen a fly caught by the legs of a centipede and passed along to the head. They fed readily on insect grubs. It was noted that centipedes often came to sugar patches.

MARCH 10th, 1932.

The PRESIDENT in the Chair.

Mr. C. N. Hawkins exhibited (1) *Boarmia rhomboidaria*, Schiff. (*gemmaria*, Brahm).—A pair from the Wandsworth District and a pair from the Box Hill District, the latter showing a distinct yellow tint in the ground colour, which is lacking in the former (Wandsworth specimens are sometimes rather more brown than those shown). (2) *Boarmia repandata*, L.—A peculiarly marked female bred 8.vi.26, from a wild Oxshott larva, and a Gynandromorph labelled "Stonehaven, *21.v.14, J. E. Gardner." This specimen is mainly female, but the antennae are partially pectinated and the genitalia are quite abnormal. He had not dissected the specimen but there appeared to be part, at least, of the right male clasper present.

Mr. A. A. W. Buckstone exhibited series of the same two species from various Surrey localities.

Mr. F. J. Coulson exhibited series of *B. rhomboidaria*, ochreous tinted from Ilfracombe, black-sprinkled from St. Leonard's-on-Sea, and others from Wandsworth and Stoke Newington; and series of *B. repandata* from the N. Forest, Wimbledon and Chingford.

Dr. G. V. Bull exhibited *B. rhomboidaria* from Herts and Kent and an example from Pitlochry almost without markings; with *B. repandata* from Herts, including a melanic example and two mauve tinted forms from Rannoch.

Dr. E. A. Cockayne exhibited a very varied series of *B. repandata* including the following specimens:—5 N. Devon; 2 Galashiels

(somewhat fulvous tinted, well-marked black transverse lines); 3 N. Derbyshire, very dark brown with pale subterminal; 2 Barnsley, very dark black-brown with distinct white subterminal; 2 N. Staffs, black with thin white subterminal and transverse lines; ab. *conversaria*, with grey-brown, dark brown, and white ground; 3 Sunderland, dull grey, markings ill-defined; 4 ab. *nigricata*, black, no markings—Knowsley; 4 Rannoch, violet grey ground, markings fairly distinct; 1 Galashiels, pale grey—no distinct markings; 3 ab. *nigropallida*, N. Wales; 5 N. Wales, grey basal area; 3 N. Wales and Staffs, very much like Barnsley.

Mr. H. B. Williams read a paper, "Notes on *Boarmia repandata* and *B. rhomboidaria*." (See p. 1.)

In the discussion which followed "black" was stated to be dominant—there was no indication of sex-linked forms. The form *conversaria* was considered dominant to other forms. The form *nigricata* was probably a dominant.

MARCH 24th, 1932.

The PRESIDENT in the Chair.

The decease of a member, Mr. J. J. Joicey, was announced.

Mr. Ennis exhibited a series of *Phigalia pedaria* taken on Wimbledon Common and in Richmond Park, including examples of ab. *monacharia*, and a batch of ova laid on the bark of oak. It was noted that many specimens had a greenish tinge, which was not found in northern examples. It was also remarked that the dark suffused northern form was very distinct from the dark suffused southern form.

Dr. H. B. Williams exhibited series of *Pieris napi* from the Irish Free State. (a) From Co. Dublin, 1st brood, May 1931, series of ♀♀ including one suffused with pale yellow on upperside and one with traces of additional markings suggesting a band of spots on both fore- and hind-wings. (b) From Co. Cork, 2nd brood, August 1931, with intense markings in both sexes. The ♀♀ especially show blackened veins on the hindwings and in many cases a distinct spot on the hindwings.

Mr. B. MacNulty exhibited preserved larvae of nearly 20 species of British Lepidoptera including *Mimas tiliae*, *Acrionicta aceris*, *Triphaena janthina*, *Cerigo matura*, *Noctua triangulum*, etc., and the young living larvae of *Neuronia popularis*.

Mr. C. N. Hawkins exhibited a short series of *Mamestra pisi*, L., bred from larvae obtained (one in 1927 and the rest in 1930) on Barnes and Wimbledon Commons. They showed a considerable range of variation both in distinction of marking and in shade of ground colour, from both well marked and lightly marked pinkish or reddish to dull brownish and ochreous forms.

A single specimen labelled "Dartford, *June 1905" and apparently very near var. *pallens*, Stdgr., was also shown.

Mr. M. Niblett exhibited the Gall wasps (Cynipidae) *Neuroterus laeviusculus*, and *Andricus (Aphilothrix) callidoma*; also Galls of *A. callidoma* in buds of oak, and of *N. laeviusculus*, with its alternating generation, *Neuroterus (Spathogaster) albipes* on leaf of oak.

Mr. A. E. Tonge exhibited three specimens of *Boarmia repandata* of a very shining brown, the ground colour being pale yellowish brown and the markings almost black. Bred ab ovo. Locality unknown.

Mr. Hy. J. Turner exhibited the remarkable gynandromorphic specimen of the South American *Colias lesbia*, which was a complex of the male and the two female forms and reported that a similar example had been recently taken near Buenos Aires by our member Capt. K. J. Hayward. It was captured in 1926 and exhibited at one of the meetings in the following year. (See Proc. 1927, p. 78).

It was reported that 8 pairs of *Polyphloca flavicornis* had been seen on Wimbledon Common, and that *Gonepteryx rhamni*, *Aglais urticae* and *Fanessa io* had also been seen. Larvae of *Lobophora halterata* were reported on aspen on Abrook Common, and in the 1st week in March three larvae of *Pieris brassicae* were found. *Pieris rapae* had been noted in W. Kent on March 9th and in Devonshire on March 5th. Mr. Jacobs reported that *Depressaria applana*, a very dark form, were on the wing in the Bromley district.

Lantern slides were exhibited by Mr. E. J. Bunnett and on behalf of Mr. Bedford, the latter being coloured by the autochrome process.

APRIL 14th, 1932.

The PRESIDENT in the Chair.

The decease of a member, Mr. R. South, for many years a regular attendant at the meetings and a past President, was announced.

Mr. Downes exhibited a short series of *Drepana falcataria* bred from larvae taken at Wimbledon on June 27th, 1931. Four

emerged on July 15th, while the fifth went over until March 3rd, 1932.

Messrs. Downes, Ennis and MacNulty exhibited (1) a series of *Erranis (Hybernia) marginaria* from Wimbledon, including typical, ab. *fuscata* and intermediate forms, and (2) Ova of *Orygia antiqua*, *Polyphoca flavicornis*, *Scopelosoma satellitia*, *Phigalia pedaria (pilosaria)*, *Colotois pennaria*, *Lygria pyraliata*, *Taeniocampa instabilis*, *Ennomos quercinaria* and *Calostigia multistrigaria*.

Mr. C. N. Hawkins exhibited a short series of *Lobophora halterata*, Hufn. (*hexapterata*, Schiff.) from Oxted, Surrey, consisting of captured and bred specimens; the latter bred from larvae obtained on July 9th, 1930 and including ab. *zonata*, Thnbg., and two dark clouded specimens, which did not emerge indoors till 13.xii.1931 and 20.iii.1932 respectively.

Mr. T. R. Eagles exhibited a male *Polyommatus icarus* showing homoösis in the form of a blue spot on the underside of the right forewing.

Mr. A. de B. Goodman exhibited a number of lepidoptera, which had come to light in his room at Shenley Wood, Bucks this year. The first species to appear was *Hybernia rupicapraria* on January 27th and continued to February 9th, when heavy frosts and snow came; the species did not reappear after the cold spell. The next species was *Phigalia pedaria* accompanied by *Hybernia marginaria* on February 1st, the former species reappeared after the cold spell on February 14th and then ceased to come to light, the latter reappeared on February 15th and continued up to April 2nd with the exception of two or three days round about February 28th, which were cold and stormy. One specimen of *Cidaria miata* came on April 2nd and on the 3rd a very worn specimen of *Hypena rostralis*, both these species were hibernated specimens.

Mr. A. E. Tonge read a paper, "The Ova of British Lepidoptera," Pt. III., dealing with the *Geometridae* and illustrated his notes with a large number of excellent lantern-slides. (See p. 11).

APRIL 28th, 1932.

The PRESIDENT in the Chair.

Messrs. E. H. Ennis, Wimbledon, and A. H. Stringer, Croydon, were elected members.

Mr. S. N. A. Jacobs exhibited larval cases of *Coleophora caespititiella* on seed heads of *Juncus communis*. The clean pinkish

white cases had been kept under cover, while the dark greyish looking ones were wintered in the open. One very small case was expected to go through a second winter.

Mr. Downes exhibited ova of *Phigalia pedaria (pilosaria)* to show the changes of colour at different times after the dates of oviposition.

Mr. Wainwright exhibited the very bright green ova of *Lycia hirtaria*.

Dr. Bull exhibited the larva of *Noctua baia* from Ham Street, Kent.

Mr. Ennis exhibited the larva of *Omphaloscelis lunosa* from Wimbledon Common.

Mr. H. W. Andrews gave a series of Notes on the Characteristics and Occurrence of the different Families and larger Genera of British Diptera.

MAY 12th, 1932.

The PRESIDENT in the Chair.

Mr. S. N. A. Jacobs exhibited hibernated larvae of *Coleophora fuscedinella* in the final stage of the winter case, which will be discarded as soon as the birch leaves are large enough to allow a new case to be made from them. Unlike many others of this Family *C. fuscedinella* discards the outgrown curved winter case instead of enlarging it. Last winter the little conical cases of the very young larvae were shown. These constitute the black portion of the present exhibit and were made from the skin of one leaf-serration, and they have been enlarged by the addition of a few leaf-skin fragments at intervals and attached to the head end, one for each pre-hibernation feeding spot. On leaving this winter case, a fragment of mine is cut out and at first this forms a longer, straight, flattened green case, afterwards shrinking and darkening to the familiar darkish brown, cylindrical case of this species.

Mr. L. H. Ennis exhibited living larvae of *Triphaena sibirica*, and from ova those of *Hybernia marginaria*, which showed much variation inter se.

Mr. K. G. Blair exhibited living and preserved larvae of *Agdistis bennettii* and *A. stictica*, pointing out the differences between the two species; also a specimen of the beetle *Oxythyrea stictica*, L., found alive in London on flowers of Anemone from S. France and brought to him by Capt. J. G. Dollman, also the tropical American Cassid

beetle *Coptocyclus sordida*, Boh., found alive in London on bananas by H. Ashby, Esq.

Dr. Bull exhibited an asymmetrically marked example of *Hypocrita jacobaeae*, and communicated a list of dates of appearances of the following species of Lepidoptera at Sandhurst, Kent, interesting in comparison with those of other localities.

May 8th. *Callophrys rubi* and *Hesperia malvae*.

May 10th. *Pieris napi*.

May 13th. *Hemerophila abruptaria*.

May 14th. *Euchloë cardamines*, *Ematurga atomaria*, and *Asthena albulata (candidata)*.

May 15th. *Pieris brassicae*, *Nisoniades tages*, and *Venilia macularia*.

May 17th. *Brenthis euphrosyne*, and *Drepana falcataria*.

May 19th. *Plusia gamma*, *Drepana binaria*, *Coenonympha pamphilus*, and *Epirrhoë alternata (sociata)*.

May 22nd. *Opisthograptis luteolata*.

Mr. S. Wakely exhibited *Semioscopis avellanella* from West Wickham.

Mr. Newman then gave a most interesting account of his collecting observations during the 1931 summer season.

He said that the season of 1931 was the worst of his 40 years experience, particularly as regards night work for larvae in the early spring. There was practically nothing at shallows, even *Taeniocampa munda* did not put in an appearance. In a lane, where for thirty-five years he had always taken many species of larvae in quantity, he only took odds and ends; for instance, instead of the larvae of *Arctia villica* being very common, he was able to find only two. Turning down larvae, usually very successful with him, was a failure. However he found a new locality for *A. villica* where it was quite abundant and he restocked his first place successfully. *Arctia caja* and *Lasiocampa quercus* larvae were absent. On the other hand the larvae of *Eutricha (Gastropacha) quercifolia* were on every blackthorn bush. *Lycaenopsis argiolus* had practically disappeared, only 2 of the first brood were noted and only one larva found. Of *Callophrys rubi* and *Polyommatus icarus* the first brood were fairly abundant. Of the 2nd brood of the latter he saw only 3 specimens. At the end of May, 1930, *Brenthis euphrosyne* was in thousands near Oxford and Abingdon, and in 1931 in four days he only took 50, and in the same time only 8 or 10 *Hamearis lucina*. In 1930 he beat 80 larvae of *Strymon quercus* in one beat, whereas in 1931 all he met

with were about 40, and most of them were ichneumonid. On June 4th his son in Sark saw a migration swarm passing all day only a few staying to rest a while. The swarm was composed of *Pieris brassicae*, *P. rapae*, *Colias croceus*, *Pyrameis atalanta* and *P. cardui*. On June 7th a single *C. croceus* put in an appearance at Bexley for the seventh year in succession. He also bred a few. On July 27th he took a worn female at Snodland, which gave him only 3 ova. *Phryxus livornica* and *Heliothis peltigera* also occurred. Everything, even *Epinephele jurtina* in July, were scarce. Snodland was, as a rule, one of the best localities for *Argynnis aglaia* but only 2 males were seen. *Plebeius aegon* was usually there in thousands, but in 1931 it was either absent or very scarce everywhere. August was the worst month, dull and wet. *Hipparchia semele* was very scarce and very scattered and only one aberration was worth noting. In five weeks he found only 2 ab. *obsoleta* of *Polyommatus thetis* (*adonis*), and *P. coridon* was scarcer than *P. thetis*. *Epinephele tithonus* was very scarce. The second half of August was unusually cool and the larvae of *Papilio machaon* had to be put in a greenhouse.

From August 26th to October 6th he was at Folkestone. *P. thetis* was well out on the 26th; it was never common, emerging the whole time, even perfect in October. There was an enormous number of *Pyrameis atalanta* and of *P. cardui* from the beginning to the end of this period. Thousands of small larvae of both species were seen but quite 90% of the smaller larvae were ichneumonid. Of *P. icarus* only one or two a day were noted. He met with the ova of *P. livornica* on *Gallium mollugo*. Of the larvae 10% were lost in instars 1 and 2, and the rest died later, 4 or 5 only reached the last skin. The larvae of *Hyloicus pinastri* failed in the last instar, and he surmised that the pine in his district of Bexley was tainted with dirt and smoke. All larvae of *Sphinx ligustri* succumbed with dysentery in the constantly wet sleeves. He saw *Polygonia c-album* in the Folkestone district for the first time. The ova of *Xylomiges conspicillaris* failed, possibly he had too many larvae together, but few pupated, most of them dying of dysentery. In 1930 he bred a black *Papilio machaon* and last year, 1931, four specimens from pupae, which lay over the winter. Of these 3 were black ♂s; every one was paired but only one ovum was fertile and the succeeding larva died in the 3rd instar.

A considerable discussion took place, Messrs. Jacobs, Williams, Hawkins, Blair, S. Wakely, Andrews, Niblett, Dr. Bull, the President and others took part.

Mr. Jacobs said that he had found the larvae of the Micro-lepidoptera generally abundant, and reported *Polygona c-album* and *Limenitis sibilla* in Slindon Woods.

Mr. de Worms had paid two visits to the New Forest and found larvae of *Triphaena fimbria* abundant and *Boarmia cinctaria* in numbers, but no *Bapta distincta* (*pictaria*) and only one *Pieris napi*.

Dr. Bull had seen only one larva of *C. rubi*. From a ♀ of *H. pinastri* he obtained ova and about 40 pupae had resulted. *P. aegon* and *H. semele* were plentiful in mid July in W. Kent.

Mr. Niblett met with only a few Trypetid flies, although larvae were quite plentiful. The gall-wasps were quite up to time in spite of the cold weather.

The President reported *P. c-album* in a garden at Reigate and also at Box Hill. *Euchloë cardamines* was common in June with *Theretra* (*Chaerocampa*) *porcellus*. *L. sibilla* had been seen on the N. Downs, was in numbers at Bookham and plentiful in Tilgate Forest.

MAY 21st, 1932.

FIELD MEETING—ST. MARTHA'S, CHILWORTH.

Leader.—Mr. T. R. EAGLES.

Nine members attended. The weather was on the whole favourable, although rain fell towards the close. Very few butterflies were seen on the wing, of moths ten species were found on tree trunks, etc.—Nearly 30 species of lepidopterous larvae were beaten including *Strymon* (*Thecla*) *w-album*, *Brachionycha sphinx*, *Chesias legatella* (*spartiata*), and four species of *Plusia*.

About 50 species of beetles were observed and several species of Hemiptera-Homoptera. Dr. E. A. Cockayne and Messrs. F. J. Coulson and K. G. Blair, have very kindly prepared lists of the lepidoptera and coleoptera respectively.

IMAGINES:—*Euchloë cardamines*, *Callophrys rubi*, *Heliaca* (*Heliodes*) *tenebrata* (*arbuti*), *Ectropis* (*Tephrosia*) *crepuscularia* (typical melanic), *Lithina chlorosata* (*Panagra petrarica*), *Perizoma flavofasciata* (*decolorata*), *P. affinitata*, *Ochyria designata* (*propugnata*), *Acasis* (*Lobophora*) *rivetata*, *Coenotephria derivata* (*nigrofasciaria*), *Bapta temerata*, *Eupithecia pusillata*.

LARVAE:—*Strymon* (*Thecla*) *w-album*, *Poecilocampa populi*, *Arctia caia*, *Cosmotriche potatoaria*, *Brachionycha sphinx*, *Amathes circellaris*,

Miselia oxyacanthae, *Plusia moneta*, *P. chrysitis*, *P. iota*, *P. pulchrina*, *Amphipyra pyramidea*, *Phigalia pedaria*, *Apocheima hispidaria*, *Campaea* (*Metrocampa*) *margaritata*, *Ectropis* (*Tephrosia*) *bistortata*, *Boarmia repandata*, *Thera obeliscata*, *Chesias legatella* (*spartiata*), *Oporinia dilutata*, *Erannis defoliaria*, *E. aurantiaria*, *E. marginaria*, *Lygris pyraliata*, *L. didymata*, *Hemithea aestivaria* (*strigata*), *Eupithecia rectangulata*, *Operophtera* (*Cheimatobia*) *brumata*, and *Cerostoma vittella*.

Beating in the lane produced COLEOPTERA:—*Athous haemorrhoidalis*, *Agriotes pallidulus*, *Malachius bipustulatus*, *Cantharis haemorrhoidalis*, *C. nigricans*, *Chrysomela polita*, *Phaedon tumidulus*, *Gastroidea polygona*, *Lochmaea suturalis*, *Otiorrhynchus singularis*, *O. ligneus*, *Phyllobius urticae*, *P. argentatus*, *Anthonomus pedicularius*, *Ceuthorrhynchus assimilis*, *C. roberti* (*alliariae*), *C. constrictus*, *Polydrosus pterygomalis*, *Tachyporus obtusus*, *T. chrysomelinus*, *Meligethes viridescens*, and *Coccinella 10-punctata*.

Sweeping bark and vegetation produced COLEOPTERA:—*Demetrias atricapillus*, *Dromius melanocephalus*, *Acupalpus meridianus*, *Psylliodes napi*, *Apion eraccae*, *Cidnorrhinus quadrimaculatus*, and *Phytonomus rumicis*. *Byturus fumatus* was plentiful in flowers of Dandelion, while *B. tomentosus* was in flowers of Hedge Parsley. HEMIPTERA:—*Harpocera thoracica*, *Miris laevigatus* and *Anthocoris nemoralis*. HOMOPTERA:—*Triecphora vulnerata* and *Thamnotettix crocea*.

Species also observed:—COLEOPTERA:—*Melolontha melolontha* (*vulgaris*) and *Aphodius punctatosulcatus*. HEMIPTERA:—*Gnathoconus albomarginatus*, *Sehirus bicolor*, etc.

The following Coleoptera were also obtained.

Beating oak in the lane:—*Balaninus glandium*, and from ivy (on oak) *Liophloeus tessulatus*.

Beating elm:—*Polydrosus cervinus*, *Phyllobius oblongus* (very common), *P. pyri*, and *Orchestes alni*.

Damp haystack refuse:—*Ephistemus globulus*, *Sericoderus lateralis*, *Trichopteryx intermedea* (*lata*), *Onthophilus striatus*, *Atomaria apicalis*, and numerous small *Staphylinidae*.

From Broom:—*Apion ulicis*, *Micrambe vini*, *Bruchidius cisti* (*villosus*) commonly, *Philorhinum sordidum*.

From dead pheasant in wood:—*Necrophorus respilloides*, *Thanatophilus sinuatus*, *Oecoptoma thoracicum*, *Aleochara cyrtula*, *Hister striola*, and several species of *Philonthus*.

From Heather below St. Martha's Tower:—*Strophosomus lateralis*, *Micrelus ericae*, *Lochmaea suturalis*, *Stenus pusillus*, etc.

MAY 26th, 1932.

The PRESIDENT in the Chair.

Mr. W. H. Windham, of Chiswick, and Mr. W. S. C. Williams, of Chingford, were elected members.

Mr. S. N. A. Jacobs exhibited an example of *Biston strataria*, Hüfn., with a melanic tendency especially in the central area; from Bromley.

Mr. Dennis exhibited a specimen of *Pieris brassicae*, in which the nervures in the apical blotch were strongly emphasised in white, similar to an example previously exhibited by Mr. R. Adkin. (Proc. 1917, p. 64, pl. II.) The specimen was bred, together with some six others of a similar form but less strongly marked, from a miscellaneous lot of larvae from Chelsea and Essex.

Mr. Hugh Main exhibited a living specimen of *Calosoma sycophanta* (Col.) from the S. of France, where it was very destructive to larvae. It had been imported in large numbers to the United States of America to deal with the devastating pest, the larvae of *Lymantria dispar*. He also showed the apterous ♀ of *Drilus flavescens* (Col.), whose larvae fed on snails, going from shell to shell and pupating in the shell of the last snail eaten.

Mr. A. A. W. Buckstone exhibited a fasciated giant stem of the wild cowslip grown in his garden. The flowers were in two tiers.

Mr. Stanley Smith exhibited the larvae of *Strymon (Thecla) pruni* from Huntingdon.

Mr. S. Wakely exhibited the hibernated larvae of *Acidalia ornata* from ova laid by a ♀ taken at Reigate, and a larva bred from an ovum laid by a ♀ of *Hadena protea* taken in cōp. with a ♂ of *Cirrhia citrigo*. The larva was identified as *H. protea*, but, as reported later, it died when full fed.

Mr. Eagles exhibited larvae of *Ruralis (Zephyrus) betulae* of small size, no doubt owing to the lateness of the season.

Mr. E. J. Bunnett exhibited the Coleopteron *Chrysomela goettingensis*, a scarce species usually, but he had found it abundantly around Shoreham.

Mr. Downes exhibited the larvae of *Pseudoterpna pruinata* and of *Boarmia rhomboidaria* from Wimbledon, and from Ascot larvae of *B. repandata*, *Biston strataria*, *Crocallis elinguaris* and ova of *Saturnia pavonia*.

Mr. K. G. Blair then read a paper entitled "Wegener's Theory of the Origin of Continents and Oceans," which he had prepared for the Annual Meeting (See page 26).

MAY 29th, 1932.

FIELD MEETING—MICKLEHAM DOWNS.

Leader—MR. S. WAKELY.

Eight members arrived at Boxhill Station for this meeting, and another member joined the party later on Mickleham Downs. The weather was not very promising at first, and proceeding over Burford Bridge to Headley Lane, the party climbed the muddy lane leading to Mickleham Downs, where a specimen of *Nola confusalis* was taken at rest on a fence. *Anaitis plagiata* had been previously taken near the Station. Rain now fell heavily, and the saturated foliage made larvae beating very unpleasant. The buckthorn (*Rhamnus catharticus*) yielded larvae of *Philereme transversata* (*rhamnata*) in numbers, and surprise was expressed by some members at the extreme variation in the colouring of these larvae. *Eupithecia* (*Tephroclystis*) *sobrinata* larvae were common on a few isolated juniper bushes, and many larvae of common species were taken, including *Hypena proboscidalis*, *Nemoria strigata*, *Boarmia ribeata* (*abietaria*) *Campaea* (*Metrocampa*) *margaritata*, and *Crocallis elinquaria*. The weather was much better later on, and the foliage in a drier state. After a pause for lunch, the ramble was continued along the top of Mickleham Downs towards Headley, and imagines of *Xanthorhoë spadicearia* (*ferrugata*), *Calostigia pectinitaria* (*viridaria*), *Eupithecia lariciata*, *Epirhoë rivata*, *Ligdia adustata*, *Bapta bimaculata* (*temerata*) and *Ectropis bistortata* (*biundularia*) were taken. *Brenthis euphrosyne*, *Callophrys rubi*, *Hesperia malvae*, and *Nisoniades tages* were the only butterflies captured. *Hamearis* (*Nemeobius*) *lucina* was not seen, although search was made at spots where it had been observed in past seasons. Imagines of the Tortrices *Hemimene plumbagana*, *Epiblema tetraquetra*, and *Tortrix conwayana* were taken, and the pretty Tineid *Pancalia leuwenhoekella* was seen at rest on its food-plant, the wild violet. Turning to the right, a descent was made towards Headley Lane, where *Hipoerita jacobaeae* was flying in some numbers. Larvae of the local plume *Pterophorus galactodactyla* were taken, but this species was evidently not common just here. Both the larva and imago were taken of *Opisthograptis luteolata*. Returning down Headley Lane, where another specimen of *Nola confusalis* was taken, tea was partaken of near Boxhill Station. Feeling somewhat refreshed after this, several members followed the road on the Ranmore side of the

Station and tried larva beating in a small wood near Norbury Park. Larvae of *Boarmia ribeata* (*abietaria*) were much more common here, about two dozen being taken, all on yew. Whilst beating here the contents of a blackcap's nest were accidentally beaten out on to a beating tray. Only one egg was broken, however, and the remaining four were returned to the nest, which was apparently none the worse for the shaking. Returning to the Station about 8 o'clock, some two dozen larvae of *Plusia moneta* were taken on delphiniums from a garden bordering the road near the railway. Neither larvae of *Strymon quercus* nor *Triphosa* (*Hydriomena*) *dubitata* were observed, it evidently being too early for the latter. There was no coleopterist among those present.

JUNE 9th, 1932.

The PRESIDENT in the Chair.

The special feature of the meeting was the exhibition of living objects and a large number of immature stages particularly of the Lepidoptera were exhibited by Messrs. MacNulty, S. Wakely, Goodman, de Worms, Hawkins, Blair, Main, Ennis, Bliss, Eagles, Dr. Bull and others.

Mr. A. de B. Goodman exhibited the Common Frog, *Rana temporaria*, and the Crested Newt (Female), *Molge cristata*, both taken in a well at Shenley Church End, Bucks.

Mr. de Worms exhibited an aberration of *Rumicia phlaeas*, which had only two spots on each of the forewings.

Mr. S. N. Jacobs exhibited a larva of *Ocyopus* sp. (*morio*?) the host of two Hymenopterous (Proctotrypid) parasites, found 2.vi.32 at Bromley, Kent. The parasites were then white and the colour started to show 4.vi.32, but both pupae subsequently died.

Mr. Wakely exhibited a larva of *Hyppena proboscidalis*, taken at the last Field Meeting at Mickleham; some larvae of *Epione* (*Euchlaena*) *vespertaria* (*parallellaria*), reared from ova sent from near York, and which were feeding on dwarf sallow and a species of willow; also larvae and pupae of *Pterophorus galactodactyla*, which had also been taken at the Mickleham Meeting.

Mr. Hawkins exhibited three forms of the larva of *Trichiura crataegi*, a banded, a black and a mottled form.

Mr. Hugh Main exhibited a cocoon and two living larvae of the large water-beetle *Hydrophilus piceus*, and said that they fed on water-snails.

Among the larvae exhibited were those of *Diacrisia mendica*, *Saturnia pavonia*, *Nudaria mundana*, *Malacosoma neustria*, *Taeniocampa incerta*, *Plastenis subtusa*, *Cleoceris riminalis*, *Scopelosoma satellitia*, *Selenia bilunaria*, *Colotois pennaria*, *Ennomos quercinaria*, *Theria rupicaprararia*, *Larentia clararia* (*cervinaria*), *Lithina chlorosata* (*petraria*), *Phigalia pedaria*, *Ectropis crepuscularia*, *Boarmia ribearia* (*abietaria*), etc.

Reports of Field Meetings at St. Martha's, Chilworth and at Mickleham were presented by Messrs. Eagles and S. Wakely respectively. (See pp. 79 and 82.)

Seasonal Notes were given by various members.

Lycaenopsis argiolus was apparently very rare at Eastbourne, though abundant at W. Wickham, fairly common at Enfield, and in gardens at Hendon. Butterflies generally were very scarce so far. *Euchloë cardamines* was generally scarce. *Tortrix viridana* larvae were abundant in a few areas in the S.W., scarce in W. Kent, practically absent in many districts. *Operophtera brumata* and *Erannis defoliaria* larvae were, on the other hand, generally common. *Hamearis lucina* was reported as absent either as ova or larvae. The "whites" were generally very scarce. *Pyrameis cardui* was reported from several localities.

JUNE 11th, 1932.

FIELD MEETING—WARLEY COMMON, BRENTWOOD.

Leader—E. E. SYMS, F.E.S.

The meeting at Warley Common was an enjoyable and successful one; the weather was fine and larvae were abundant. The members spent the time working over the northern part of the Common where full grown larvae of *Orygia gonostigma* were found and young larvae of *Taeniocampa miniosa* were plentiful. Other larvae reported were *Polyphoca diluta*, *Leucoma similis* = *chrysorrhoea*, the following three species on broom *Chesias legatella* = *spartiata*, *Pseudoterpna pruinata*, and *Depressaria assimilella*. *Tortrix heparana*, *T. ribeana*, *Penthina corticana*, *Cerostoma costella*, and *Tachyptilia populella* were also recorded.

Mr. Eagles worked for Coleoptera and the following were reported as having been taken: *Polydrosus cervinus*, *Balaninus villosus*, *B. venosus*, *Phylliobius argentatus*, *P. pyri*, *Attelabus nitens*, *Strophosomus melanogrammus*, *Prosternon holosericeus*, *Athous haemorrhoidalis*,

Dolopius marginatus, *Elater balteatus*, *Malachius bipustulatus*, *Rhagonycha lignosa*, *R. limbata*, *Cantharis pallida*, *Byturus tomentosus*, *Luperus longicornis*, *Clytus arietis*, *Helops laevioctostriatus*, *Coccinella 10-punctata*, *Exochomus 4-pustulatus*.

Of the other Orders only the small grasshopper, *Tettix bipunctatus*, and the large snake fly, *Rhaphidia notata*, were reported.

Eight members sat down to a well-earned tea before returning home.

JUNE 19th, 1932.

FIELD MEETING—GROOMBRIDGE.

Leader—DR. G. V. BULL, B.A., M.B.

The fourth Field Meeting of the season was held at Broadwater Forest, and an enjoyable day was spent in a locality which was new to most of the nine members who were present. On the way from Groombridge station *Nola confusalis* was beaten from the hedgerow. On reaching the Forest the party dispersed over the area and by lunch time 26 species of Macro-Lepidoptera had been noted including *Brenthis selene*, *Gonepteryx rhamni* (ova, larvae and imagines), *Phytometra viridaria* (*aenea*), *Euchoeca nebulata* (*obliterata*), *Erastria fasciana*, *Semiothisa notata* and *Diacrisia sannio*. After lunch the sun went in and conditions were not so favourable, but 10 further species were secured including *Bapta temerata*, *Ectropis extersaria* (*luridata*), *Acrionicta leporina* and *Perizoma albulata*, also larvae of the following *Brephos parthenias*, *Polyplocia flavicornis*, *Poecilocampa populi*, *Cosmotriche potatoaria*, *Panolis griseovariegata* (*piniperda*), *Zephyrus* (*Strymon*) *quercus*, *Taeniocampa incerta*, and *Cerostoma xylostella*. Of Micro-lepidoptera 17 species were taken and 18 species of Coleoptera.

The following complete the list of 38 species of Macro-lepidoptera:—*Euphya corylata*, *Eulype hastata*, *Ectropis punctulata*, *Xanthorhoë montanata*, *Cabera pusaria*, *Pseudopantharia macularia*, *Lithina chlorosata* (*petraria*), *Iodis lactearia*, *Euclidia mi*, *Epirrhoë alternata* (*sociata*), *Boarmia consonaria*, *Lomaspilis marginata*, *Drepana falcataria*, *Ematurga atomaria*, *Macrothylacia rubi*, *Perconia strigillaria*, *Thera obeliscata*, *Campptogramma bilineata*, *Plusia gamma*, *Brenthis euphrosyne*, *Pieris rapae*, *Coenonympha pamphilus*, *Hesperia malvae* and *Augiades sylvanus*. Also ova of *Euchloë cardamines*. Mr. Wakely subsequently reported *Eupithecia nanata* and *Acidalia floslactata* (*remutata*).

The Micro-Lepidoptera reported were, by Mr. S. Wakely *Perinephele lancealis*, *Crambus pratellus*, *Tortrix incertana*, *Eretria pinivorana*, *E. pinicolana*, *Epiblema bilunana*, *Tinea parasitella*, *Pleurota bicostella*, *Adela degeerella*, *Cedestis gysselella*, *Gelechia proximella*, and *Myelois neophanes* a very local and uncommon species was subsequently identified.

By Mr. H. J. Turner *Fumea casta* a Psychid case on heath. ♀ bred, wingless; *Tortrix ministrana* from hazel and birch; *Bactra lanceolana* among rushes in number; *Sericoris urticana*, birch; *Glyphipteryx thrasonella* in the swampy parts and *Ocnerostoma piniariella* among pines—beaten.

The Coleoptera which were reported are:—*Nebria brevicollis*, *Cantharis pallida*, *Rhagonycha lignosa*, *Elater sanguinolentus*, *Athous haemorrhoidalis*, and *A. longicollis*, *Selatosomus incanus*, *Dolopius marginatus*, *Chilocorus similis*, *Mysia oblongoguttata*, *Anaitis ocellata*, *Rhynchites betulae*, *Phyllobius glaucus*, *P. argentatus* and *P. pyri*, *Phytodecta riminalis*, *Luperus longicornis*, *Helops laevioctostriatus*, and the Hemipteron *Gastrodes ferrugineus*.

JUNE 23rd, 1932.

The PRESIDENT in the Chair.

Mr. H. Moore exhibited the early spring bee, *Anthophora pilipes* (*acerrorum*), and referred to the difference of the two sexes. The ♀ was very like a small humble-bee somewhat dark in coloration, while the ♂ was bright fulvous. He showed one specimen with gynandromorphous features, one side of the face had the yellow colour of the ♂, the other side was that of a normal ♀.

Mr. Eagles exhibited a pupa of *Strymon pruni* from Monk's Wood and larvae of *Anticlea badiata* from Hoddesdon.

Mr. Howarth exhibited larvae of *Leucoma salicis* from Canvey Island.

Mr. Syms exhibited the larva of *Microdon eggeri* from an ants' nest at Byfleet. (Dip.)

Mr. Robert Adkin exhibited specimens of *Roeselia* (*Nola*) *confusalis*, H.-S. taken in his garden at Eastbourne during the first half of the present month. He said that one usually associated this species with oak-woods, and a garden almost on the sea-shore, miles away from any *Quercus robur* or *Q. sessiliflora*, seemed to be an unlikely place for the species to breed in, but there was a possibility that the

evergreen oak, *Q. ilex* or the cultivated apple trees, both of which were in the garden, might supply the necessary pabulum. Barrett remarks that "It doubtless flies at night, but is rarely captured on the wing." One of the specimens taken on the wing at about 9 p.m. appears to confirm this.

Mr. M. Niblett exhibited a number *Trypetidae* (Dip.) which were attached to the following plants—*Centaurea scabiosa*, *Arctium major*, *Carduus nutans*, *Unicus arvensis*, *C. palustris* and *Serratula tinctoria*.

Reports of various captures and observations were communicated. *Pyrameis cardui* had been seen by several members, *Phryxus livornica* was reported from Cornwall, the larvae of *Ruralis betulae* were quite small at this date, *Leptosia sinapis* occurred only in very small numbers, the colonies of the "large copper" *Chrysophanus dispar* ssp. *batarus* were reported as flourishing and even extending, *Papilio machaon* was in fair numbers in the fens, but other usual fen insects were scarce.

JULY 10th, 1932.

FIELD MEETING—FOREST ROW.

Leader.—Mr. S. N. A. JACOBS.

The party met on the borders of Ashdown Forest about 10.30, after having unavailingly examined the "productive fence" advertised in the circular. The trouble in this case was that the fence had only recently been renewed.

The weather was ideal, being warm and sunny, with but a slight breeze to save the day from being oppressive.

The party decided to work the East side of the road before lunch and the Western side in the afternoon, and forthwith the members spread out and started to work. A circular route was taken arriving at the starting point about 1 p.m. for lunch. Amongst the interesting observations of the morning was a wasp's nest in a Fir trunk, about which many specimens of *Meliphora grisella* were found together with one *Aphomia sociella*.

The afternoon's work was the more productive, as the party worked out over the stream to the West of the road and up over the sphagnum moss-covered slope. Here the usual moorland species were in evidence and the sun-dew plant abundant, in one plant of which, a specimen of *Coenonympha pamphilus* was noted, firmly held

by the leaves. Bog Asphodel was in full flower, and plentiful in the many marshy spots.

Larvae of *Dicranura bifida*, *D. vinula*, *Panolis griseovariegata* (*piniperda*), *Pygaera pigra*, *Pheosia tremula* (*dictaea*), and *Bupalus piniaria* were found, some of the species singly; others in plenty.

Of the butterflies, the "Ringlet" (*Aphantopus hyperantus*) and the large and small "skippers" were really the only ones in evidence, though *Gonepteryx rhamni* was noted on the wing, as also *Pieris brassicae*, *P. napi*, *Epinephele jurtina*, and *C. pamphilus*. *Cupido minimus* was taken in worn condition, but the expected *Plebeius aegon* was not to be found, the date, perhaps, being a little early. Larvae of *Vanessa io* were taken in plenty.

Besides Lepidoptera, Coleoptera and Hymenoptera received their share of attention, and the party retired to the "Brambletye Arms," a name associated with the destructive habits of a certain Mr. Cromwell, who destroyed a beautiful mansion of that name, for tea and so home.

JULY 14th, 1932.

The PRESIDENT in the Chair.

Mr. Stanley-Smith reported *Colias croceus* from Aldborough, Suffolk and also the occurrence of examples of *Hyloicus pinastri* on the pine trunks; he exhibited a rather aberrant form of *Hadena rectilinea*. He reported that he had bred *Tapinostola elymi* from the stems of *Elymus arenarius*.

Mr. Niblett exhibited the gall-cases made by *Phyllotoma aceris* in the leaves of the sycamore.

Mr. Eagles exhibited the larvae of *Coenotephria derivata* (*nigro-fasciaria*) from Hoddesdon, Herts.

Mr. Wakely reported *Cerura bifida* and *Pterostoma palpina* from Ashdown Forest.

Mr. C. N. Hawkins exhibited:—(1) Larvae of *Nyssia zonaria*, Schiff. from Llandudno district, N. Wales, received from Mr. S. H. Brocklesby. (2) Larvae of *Aspitates gilvaria*, Schiff. from Box-hill.

Dr. Bull reported the larvae of *Dianthoecia carpophaga* as common on Dungeness. He showed the small nest of an arboreal-wasp. Also a parasite, which attacked the larvae of *Eupithecia absynthiata*.

Mr. Grosvenor exhibited a yellow form of *Zygaena filipendulae*, which he had just bred. From the first pairing he obtained no

yellow form. The next generation produced 25% of yellow forms. In the subsequent generation all specimens bred so far were yellow.

Dr. Cockayne exhibited the larvae of *Eupithecia pygmeata* from Cambridgeshire. The brown form, as figured in Buckler's "Larvae," had colourless blood and white fat. The green form had the skin tinged with yellow and both blood and fat an emerald green. They were fed on Mouse-ear Chickweed, *Cerastium*.

Mr. de Worms reported the following species as fairly plentiful, *Melanargia galathea*, *Argynnis aglaia*, *Plebeius aegon*, *Polyommatus icarus*, *Epinephele tithonus*, *Thymelicus actaeon*, *Limenitis sibilla*, *Argynnis paphia*, *A. adippe* and *P. coridon*. He had met with *Coenonympha tiphon* and *Erebia epiphron* f. *cassiope* about their usual date.

Mr. Palmer reported the *artaxerxes* form of *Plebeius medon* as beginning to emerge and that he had seen only one *Argynnis aglaia* to date.

Mr. Downes reported the occurrence of *Plusia gamma* and *Phryxus livornica*.

Mr. H. Niblett read a paper "Plant Galls" and placed numerous exhibits on the table to illustrate his remarks. (See p. 36).

JULY 16th, 1932.

FIELD MEETING—EYNSFORD.

Leader.—S. N. A. JACOBS.

Again the weather was all that could be desired for collecting purposes, and insects were plentiful.

The morning was spent on the hills West of the rifle range, and various captures were made here, but it was on the rifle range that the larger number were made, during the afternoon's work.

Most of the usual, and some unusual downland insects were to be found, including *Limenitis sibilla*, which was noted in some numbers, flying around the woods on the top of the hill. Other butterflies were *Argynnis aglaia*, *Pieris napi*, *P. rapae*, *Hipparchia semele*, *Aphantopus hyperantus*, *Epinephele jurtina*, *Plebeius aegon*, *Polyommatus icarus*, *Coenonympha pamphilus*, and *Angiades sylvanus*.

Campion heads gathered produced larvae of *Dianthoecia capsicola*, *Eupithecia venosata*, etc.

Most members returned well laden to tea at "Hill Croft" tea gardens, and so home.

Mr. K. G. Blair reported the following :—

LEPIDOPTERA.—*Nygmia chrysorrhoea* (*similis*), *Ptychopoda dimidiata*, *P. dilutaria* and *Lygris populata* (*dotata*) *Marasmarcha phaeodactyla* with larvae of *Euclidia mi*, *Hadena pisi*, *Dianthoecia capsicola*, *Eupithecia venosata*, *Pempelia plumbella* and *Depressaria heracleana* (on *Pastinaca sativa*).

COLEOPTERA.—*Apion tenue* and *Sitona crinitus* on Sanfoin; *Bruchus debilis* on Rockrose. *Ceuthorrhynchus asperifoliarum*, *Longitarsus exoletus*, *Meligethes murinus* on *Echium*. *Epitrix atropae* on *Atropa*. *Isomira murina*, *Cryptocephalus fulvus*, by sweeping. Larvae of *Thea 22-punctata* on *Pastinaca*.

HEMIPTERA.—The peculiar brachypterous ♀ of *Myrmedobia distinguenda*.

HYMENOPTERA.—Galls of *Rhodites mayri* on wild Rose.

JULY 23rd, 1932.

FIELD MEETING—BOX HILL.

Leader—C. N. HAWKINS, F.E.S.

This Meeting was arranged for general collecting of all Orders and was favoured by fairly fine weather, although there was not much sunshine. Fifteen members and friends attended, distributed between an all-day party of 8, and an afternoon party, under the leadership of Mr. Jacobs, of 7. An especially good feature was the attendance and enthusiasm of several of the younger members of the Society.

The area worked comprised the northern valleys and slopes of Box Hill but no fixed route was laid down and members, once on the ground, scattered into small parties and met again at about 5.30 for a very enjoyable tea at the Railway Hotel. After tea, several members returned to the collecting ground and put another hour or two in working over part of the area not touched previously during the day. The Society has paid many visits to this district, so that a very detailed report is hardly necessary but, amongst the Macro-Lepidoptera, the following, besides the more common species, were taken or seen :—Ova.—*Angiades sylvanus*, L. Larvae.—*Gonepteryx rhamni*, L., *Callophrys rubi*, L., *Sphinx ligustri*, L., *Drymonia chaonia*, Hb., *Notodonta dromedarius*, L., *Thyatira batis*, L., *Cilia glaucata*, Sc., (*spinula*, Schiff.), *Nola cucullatella*, L., *N.*

confusalis, H.-S., *Panolis* (*Trachea*) *griseo-variegata*, Göze. (*piniperda*, Panz.), *Cucullia verbasci*, L., *Anaitis efformata*, Gn. (? *plagiata*, L.), *Acasis* (*Lobophora*) *viretata*, Hb., *Chloroclysta siterata*, Hufn., *Eupithecia venosata*, Fb., *E. satyrata*, Hb., *E. lariciata*, Frr., *Chloroclystis coronata*, Hb., *Ligdia adustata*, Schiff., *Bapta bimaculata*, Fb. (*taminata*, Schiff.), *B. temerata*, Schiff., *Pseudopanthera* (*Venilia*) *macularia*, L., *Ectropis* (*Tephrosia*) *crepuscularia*, Hb., *E. (T.) consonaria*, Hb., *E. (T.) punctulata*, Schiff., *Aspitates gilvaria*, Schiff. and *Ellopia fasciaria*.

Imagines.—*Colias croceus*, Fourc. ♂, *Argynnis aglaia*, L., *Urbicola* (*Augiades*) *comma*, L., *A. sylvanus*, Esp. (♀ ovipositing), *Nola cucullatella*, L., *Lithosia deplana*, Esp., *Metachrostis* (*Bryophila*) *perla*, F., *Toxocampa pastinum*, Tr., *Ortholitha bipunctaria*, Schiff., *Dysstroma truncata*, Hufn., *Calostigia* (*Amoebe*) *pectinitaria*, Knoch. (*viridaria*, Fb.), *Euphyia silaceata*, Schiff., *Boarmia rhomboidaria*, Schiff. (*gemmaria*, Brahm.), *Itame wanaria*, L.

The following is a list of the Micro-lepidoptera reported by Mr. S. N. Jacobs:—*Crambus inquinatellus*, *Pyrausta cespitalis*, *Euwanthis zoegana*, *Ancyliis comptana*, *Lethronympha hypericana*, *Argyroploce cespitana*, *Panalia leuwenhoekella*, *Argyresthia goedartella*, *A. retinella* and *Prays curtisellus*, including one black and one buff form.

Mr. Coulson reported the following Coleoptera:—*Apteropeda orbiculata*, *Leptura maculata*, *Cryptocephalus labiatus* (commonly), *C. fulvus*, *C. bilineatus*, *Sphaeroderma testaceum*, *Cionus pulchellus*, *C. hortulanus* (commonly), *C. scrophulariae*, *Aphidecta obliterated*, *Anthobium ophthalmicum* (in abundance on bramble and thistle plumes, etc).

Mr. K. G. Blair reported the following COLEOPTERA:— on larch *Aphidecta obliterated*, *Otiorrhynchus clavipes*, *Dromius quadrinotatus*, *Salpingus castaneus*, *Dryophilus pusillus*. On *Inula conyza*:—*Cassida fastuosa* (all stages) the larvae rather heavily parasitised. On *Verbascum nigrum*:—*Cionus thapsus*. Sweeping low plants:—*Cryptocephalus fulvus*, *C. bilineatus* and *C. hypochaeridis*. In moss on ground:—*Barypithes araneiformis*. In Hairbell:—*Miarus degorsi*.

HEMIPTERA:—A single example of the rare and beautiful Tingid *Monanthia ciliata* was also obtained on *Verbascum nigrum*.

PSOCOPTERA: (Mainly beaten from pines and larch) *Psocus fasciatus*, *P. bifasciatus*, *Mesopsocus unipunctatus*, *Elipsocus flaviceps*, *E. westwoodi*, *Graphopsocus cruciatus*, *Peripsocus phaeopterus*.

On the whole, the Meeting was most successful and was, I believe, thoroughly enjoyed by all.

In conclusion, may I add a word of thanks to Mrs. Jacobs and Mr. Bliss for their services in wielding their respective tea-pots so efficiently.

JULY 28th, 1932.

MR. T. H. L. GROSVENOR, F.E.S., PRESIDENT in the Chair.

Mr. S. N. A. Jacobs exhibited his captures at the two Field Meetings held at Forest Row, July 10th, and Eynsford, July 16th, in illustration of his Reports on the meetings.

Mr. Windham exhibited ova of *Zeuzera pyrina (aesculi)* from Wimbledon.

Mr. Ennis exhibited larvae of *Sphinx ligustri* found wild on the wayfaring-tree.

Mr. Howarth exhibited larvae of *Callophrys rubi* found wild feeding on dogwood at Box Hill.

Mr. Syms exhibited examples of the dragon-fly, *Somatochlora metallica* from Surrey, a species which until recently had only been found very sparingly in Invernessshire.

Dr. Bull exhibited a bred series of *Boarmia roboraria* mostly of a dark grey tone of colour intermediate between the typical and melanic forms, from Beckley, Sussex. They were somewhat small, possibly due to the young larvae having to feed on oak buds. He also showed larvae of *Cepphis advenaria* from the New Forest.

Mr. Robert Adkin exhibited a dark form of *Boarmia rhomboidaria (gemmaria)* ♂ that came to light in his house at Eastbourne on July 9th, together with typical specimens, also race *rebeli* for comparison, and mentioned that he was unable to capture an apparently identical specimen that turned up a night or two later. The specimen may be described as blackish grey with all the usual markings showing indistinctly. Compared with typical specimens the colour is much darker, considerably darker even than *perfumaria* and having none of the violaceous shade of that form, while it differs from *rebeli* in being of a blackish grey rather than brownish-black and in the presence of all the usual markings. It appeared to be a true melanic and he thought it remarkable that such should occur on the chalky soil of the district.

He also showed two specimens of *Agrotis corticea* taken at light in his house on July 2nd and 4th respectively. He said that in his "Moths of Eastbourne" this species was mentioned as "not

uncommon in Abbot's Wood," but the capture of these specimens showed that it also occurred in the town of Eastbourne.

Mr. C. N. Hawkins, exhibited 1. *Palimpsestis* (*Cymatophora*) *or*, F.—An extraordinary aberration with the outer marginal areas of the forewings, especially towards the anal angles, whitish and the submarginal row of spots entirely missing except for one spot near the apex of each wing; the reniform and discoidal spots confluent; the rest of the forewings much darker than usual and the cross lines blurred and indistinct, the outer ones partially obliterated towards the hind margins by an inward spread of the white of the outer marginal areas. The hindwings are white with a small, dark, basal cloud and a narrow dark band around the margins. The extreme outer edge of the hindwing fringes is also white. The specimen is a ♀ and is one of an otherwise normal brood bred *ab ovo*. The parents were bred from larvae found on Aspen at Oxted in 1930. A normal ♀ of the same brood is shown for comparison.

2. *Thera obeliscata*, Hb.—A very melanic specimen bred from a larva found on Pine in Surrey on 22.iv.32.

3. *Eupithecia arcuata*, Fr.—Three specimens bred this year from larvae beaten from Juniper in Surrey.

4. Larvae of *Eriogaster* (*Lachneis*) *lanestris*, L.—From the Essex Coast.

5. Larvae of *Pseudopanthera* (*Venilia*) *macularia*, L.—From Box Hill, 23.vii.32.

Mr. J. A. Downes exhibited *Selenia tetralunaria* and contributed the following note:—1. "On May 14th I took a ♀ *Selenia tetralunaria* at rest on a grass-blade at Ascot. Between May 14th and 17th it laid 16 ova. These hatched about June 1st, *i.e.*, in 17 days. The larvae, with one exception, fed quickly, and pupated about July 10th. Most of the moths have emerged, after a pupal stage of about 14 days, and I have already obtained a number of ova. All the larvae except one had 3 moults, but the exception, which is still feeding, has had I think, an extra moult.

I am exhibiting this late larva, a cocoon (very slight), with empty pupa-case, and a ♀ moth to show resting position. The moth rests in a position somewhat similar to that of *Mimas* (*Dilina*) *tiliae*, and quite unlike that of *S. bilunaria* which folds its wings like a butterfly. I am also showing some ova recently obtained.

2. 21 ova of *Aventia flexula* from a moth taken at Box Hill on July 17th.

3. Larvae of *Saturnia pavonia*, reared from ova laid by a moth taken at Ascot on May 5th.

Dr. Cockayne exhibited a small portion of a willow stem with the gall made by the Sesiid larva, *Synanthedon flaviventris*, from which the pupa-case was protruding, the moth having emerged. He had noticed that most of those which continued to feed until spring were parasitised.

Mr. Bunnett exhibited the larvae of *Notodonta ziczac*, *Trichiosoma lucorum*, the Saw-fly of the hawthorn with the cocoons and imagines, and the beetle *Phytodecta rufipes* bred from larvae taken at Chislehurst.

The President remarked on the number of pupa-cases of *Synanthedon sphaeriformis*, which he had recently observed protruding from the larval burrows in the alder branches in Tilgate Forest.

Members reported *Limenitis sibilla* from Croydon, Eynsford, Tilgate Forest, Epping Forest.

Mr. S. N. A. Jacobs read reports on the recent Field Meetings at Forest Row and Eynsford of which he was the leader. (See pp. 87 and 89).

AUGUST 11th, 1932.

The PRESIDENT in the Chair.

The President exhibited a long series of bred *Zygaena filipendulae* and explained his further experiments with this species.

Mr. H. Moore exhibited an albino specimen of the House-martin (*Chelidon urbica*, L.) from Northampton. It was a completely white example and lent to him by Mr. A. C. Cook, a former member of the Society.

Mr. T. R. Eagles exhibited a pupa of *Gonepteryx rhamni* on a spray of *Rhamnus frangula*, from an egg found at the Groombridge Field Meeting on June 19th. Also larvae of *Erastria fasciana* from eggs laid by a female taken by Mr. Wakely at the same meeting. The moth selected brome grass (*Bromus sterilis*) on which to lay. The larvae would eat this grass and couch-grass (*Agropyrum repens*), but was averse to *Holcus mollis* and *Dactylis glomerata*.

Mr. K. G. Blair exhibited galls of *Agromyza schineri* on Aspen and read the following note:—

A gall found at Hoddesdon on Aspen by Mr. T. R. Eagles and kindly given to me, was exhibited by me at our meeting of August

27th, 1931, together with the Braconid parasite that emerged from it. This year Mr. Eagles was good enough to supply me with several more of the galls from the same locality and from these emerged two of the flies (one crippled) and two species of parasites, the same Braconid and a Chalcid, *Sphægigaster* sp.

The galls, which occur singly on the slender twigs of Aspen, form small swellings on one side of the twig, superficially resembling the cocoon of a Nolid moth. Only the soft tissue between the wood and the bark is affected, with considerable proliferation of the tissue, and but one larva is found in each. At the escape of the *Agromyza* a neat circular door is opened in the wall of the gall, which remains attached at one side; the door is presumably prepared by the *Agromyza* larva before pupation. If, however, a parasite has emerged a jagged open round hole is left.

The gall is figured, though undetermined, by Edward Connold in "Plant Galls of Great Britain" (1909), no. 21.

Mr. Robert Adkin exhibited a series of the Tineid *Limnoecia phragmitella*, Staint., together with seed-heads of *Typha latifolia* from which the moths had been bred, also a pupa *in situ*, and read the following note:—

On August 31st, 1931, Mr. A. L. Rayward took a very worn Coleophorid-looking little moth which in spite of its almost scaleless condition we were ultimately enabled to identify as *L. phragmitella*, a species which had not previously been recorded for the Eastbourne district. Knowing that it was a species that would be unlikely to occur singly, at the end of May of the present year I visited the locality where the moth had been taken, in the hope of finding larvae, but to my dismay, the only *Typha* seed-heads remaining were standing well out in a rather deep pond where it was impossible for me to reach them even with the aid of my walking stick. However, a couple of weeks later, armed with what gardeners know as a long-arm, and accompanied by my friend Rayward, we made another attempt, and this time succeeded in securing about half-a-dozen seed heads, from which some three dozen moths have already been reared and apparently there are still more to come.

In Stainton's "Natural History of the Tineina" Vol. XI, page 150, under the name of *Laverna phragmitella*, there is a very good account of the life-history of this species, which is also well illustrated on plate IV., but I do not think the picture of the seed-head there given would lead one to the larva, at any rate in spring, which is the time when the larvae are fell-fed and therefore the best

for collecting them. The picture shows a nice ripe brown seed-head with the "wool" hanging out in great bunches, it really reminds one of the pictures we have seen of a bursting shell, and I do not dispute the fact that this effect may be caused by the larvae in autumn, although it is very suggestive of the natural disintegration of the seed-head. If, however, one visits a *Typha* bed in May or June it will be noticed that the seed has blown away from most of the heads, leaving bare stems sticking up out of the water, but that some others still carry their seed and have a matted, dried up appearance; if these are collected they will, in all probability, produce the moth. I may mention that the moth was also bred by Mr. Rayward from seed-heads of *Typha angustifolia* that he took in Dunge Marsh in June last. (See pl. IX.)

He also exhibited specimens of *Thamnonoma (Halia) wauaria*, L., a species that had come to light in his house at Eastbourne during the past month or so in some numbers. He said that some few weeks ago several letters appeared in the daily press complaining of the ravages caused to gooseberry bushes by "the caterpillars of the gooseberry moth." At the time, knowing the very loose terms used by the average writer to the daily papers, I concluded that the trouble was probably caused by larvae of the gooseberry sawfly (*Nematus ribesii*, Curtis) which were far too common on the bushes in my garden, but more recently, the unusual number of *T. wauaria* (which, by the way, I have often heard called the "gooseberry moth,") that I have met with has caused me to wonder whether this species may not, after all, have been the culprit. It would be interesting to know whether *T. wauaria* has really ever been so abundant as to be regarded as a pest; perhaps some of our members may be able to throw light on the subject.

Mr. Adkin reported that for the Eastbourne district the first specimen of *Cotias croceus*, Fourcroy, that had come under his notice was what appeared to be a somewhat faded male that was flying on the Parade banks on the morning of July 21st. On the 30th 3 or 4 were seen in the same place. During the week ending August 6th a few odd specimens were seen by Mr. Rayward in various places on the Downs, and on the 8th some half dozen were seen on the Parade banks and some of them were certainly females, but none of them appeared to be freshly emerged.

Mr. Howarth exhibited the larvae of *Sphinx ligustri* from Wimbledon.

Dr. Bull reported that during the previous three weeks sugar had

EXPLANATION OF PLATE IX.

Seed-head of the Reed Mace (*Typha latifolia*) as it appears in spring, when the larvae of *Limnaecia phragmitella*, which are feeding in it, are nearing maturity.



Photo: A. W. Dennis.

been a failure, but at light moths were fairly common. After the rain came, moths began to come in plenty. At his first visit to Royston he had found *Polyommatus coridon* very scarce, but later it had been found there in plenty.

Polygonia c-album, *Limenitis sibilla* and *Argynnis aglaia* had been observed by various members.

AUGUST 25th, 1932.

MR. K. G. BLAIR, VICE-PRESIDENT, in the Chair.

Mr. Priske exhibited the shell of the very local snail *Helicodonta (Helix) obvoluta* from one of its few colonies in this country near Amberley, Sussex. It occurs in beech woods. It was found under a log and had its aestivating diaphragm complete.

Mr. E. J. Bunnett exhibited four specimens taken on one short piece of a log of wood at Box Hill; two *Hadena nana (dentina)* and two beetles *Tetropium fuscum*. Also larvae of *Ptychopoda trigeminata* from Catford, a larva of *Cerura bifida* from Bookham, and a very green larva of *Biston betularia*.

Mr. Eagles exhibited larvae of *Eupithecia centaureata (oblongata)* and of *P. trigeminata* on *Hypericum*.

Mr. Priest exhibited a series of *Melanargia galathea* from Ventnor.

Mr. S. Wakely exhibited imagines of *Epione (Euchlaena) parallellaria = respertaria* bred from Yorkshire ova. The larvae commenced to hatch on May 13th, and fed up on *Salix repens* and later on another species of willow. Ordinary sawfly was refused. The perfect insects emerged from May 29th to June 3rd. Specimens of *E. repandaria (apiciaria)* were also exhibited for comparison. A specimen of *Myelois neophanes* taken at the Groombridge Field Meeting was exhibited at the same time. It was beaten from Scotch Fir in Broadwater Forest, and is a local and scarce species. Mr. Wakely's exhibit also included a specimen of *Aphomia gularis*, Zeller, taken in Moor Lane, Finsbury, E.C., on July 15th. This introduced species is a native of the Far East (China, India, etc.), but has been taken in recent years at Bourneville.

Mr. Robert Adkin exhibited a series of the moth *Aphomia sociella*, L. and read the following note on a case of protective resemblance.—On July 16th last I was passing an old cypress tree in my garden when I noticed what appeared to be a splinter sticking out from the stump of a branch that had been cut off during the previous winter ;

the tree stands beside a narrow path and the "splinter" was at the height of one's face. I turned to find the gardener and to remonstrate with him for leaving so dangerous a "splinter" on the stump of the branch, when it occurred to me that I had passed this spot dozens of times since the branch was cut and had not previously noticed anything of the sort, and therefore returned to the tree to make sure that I had not been mistaken, and on a closer examination, found that what I had thought to be a "splinter" was a moth resting in an attitude that gave an exact resemblance of a splinter.

He also exhibited a series of the Tortrix *Argyroplote* (*Orthotaenia*) *striana*, Schiff., taken at light in his home at Eastbourne. He said that although he had collected in the neighbourhood for many years he had not come across this generally common species until he had tried a light trap, during the past two or three years, in which he had taken it quite frequently practically throughout the summer months.

Referring to his exhibit of *Limnoecia phragmitella* at the previous meeting, Mr. Adkin said that it was interesting to note that he had reared an imago from the pupa exhibited *in situ* in the downy seed of *Typha*, and further, that he had bred several specimens from the stems of the plant. He noticed that some of the larvae had left the seed-heads in which they had fed up and wandered about on the stems and these he found had pupated beneath the dry leaf-sheaths that surround the stems. The normal habit of the larvae appeared to be to pupate in the down of the seed-heads in which they had fed, but some few of them evidently had the habit of seeking the shelter of the stem for the purpose.

Mr. Hawkins exhibited a short series of *Lygria pyraliata* from Braemar and pointed out the distinct tooth in the transverse line on the underside of the hindwing, whereas in the related species the angle was especially rounded.

Mr. Blair exhibited the Braconid parasites *Ischnocarpa pumila*, Nees and *Aspilota distincta*, Nees, sent by Mr. Wightman as parasites of *Heliothis peltigera*. This group of the *Braconidae*, however, appear to confine their attacks to Dipterous larvae, and it was suggested that their hosts had been leaf-mining Dipterous larvae in the *Senecio* plants supplied to the *Heliothis* larvae. The parasites had been kindly determined by Mr. G.E. Nixon.

Dr. Bull reported that he had bred a variety of *Palimpsestis* or from Herts in which the costa and "lutestring" areas were very dark, and an asymmetrical *Pieris brassicae* bred from a pupa taken

in Regents Park in July. He also reported the occurrence of a second brood of *Brenthis selene* in East Sussex during August, and much more plentiful than usual; that larvae of *Heliothis peltigera* were in small numbers on Dungeness; that he had found species with second emergences were late and often uncommon. He also exhibited a bullrush with an accessory head and a cruciform form of *Buddleia*.

Reports on the season were made. *Colias croceus* had been noted in Kent and also at Swanage, with *Melanargia galathea* and *Thymelicus acteon* at the latter place; various reports of *Plusia gamma* common, *Pyrameis cardui*, *P. atalanta*, *Vanessa io*, *Aglaia urticae* and at Byfleet *Polygonia c-album*.

SEPTEMBER 8th, 1932.

The PRESIDENT in the Chair.

Mr. S. J. Turpin, of Willesden; Mr. R. N. Coe of New Malden; and Mr. A. M. Low of Gunnersbury were elected members.

Mr. C. N. Hawkins exhibited larvae of *Miltochrista (Calligenia) miniata*, Forst., and read the following note on the feeding habit of the species. "The larvae were bred from ova laid by a ♀ taken at Southend and received from Mr. C. de Worms on 14.vii.32. The larvae hatched during July 14th and 15th, but unfortunately a considerable number died before I found the right method of feeding them. These larvae are said to feed on *Lichenes* and decaying leaves of *Quercus* and *Salix*, so that at first I gave them more or less dead leaves of willow alone, which I have previously found to be a very good food for *Lithosia griseola*, Hb. For a time I thought the larvae nibbled these, but they did not grow at all and after about a week I found a number of them had died. I then decided to try the survivors with a green *Alga*, which I had seen growing on oak bark. I cut off a few small pieces of bark covered with the *Alga*, damped it, placed it in a metal, glass-topped box and put the larvae on it. Very soon they began to move about and appeared to be nibbling the alga. By the next day a dozen of them were evidently feeding and had crawled on to the oak and willow leaves and were eating the surface away. After this they fed and grew steadily mostly feeding on the oak leaves, but occasionally eating the willow and sometimes several were to be found on the bark again for a short time. They seem to require a fair amount of moisture and I

damped both bark and leaves every few days and added fresh bark and leaves at intervals. The two largest individuals have much outgrown the others although I believe all have had the same number of moults, *viz.* six. So far as the largest one (which appears to be about half-grown in its last skin) is concerned moults have taken place on August 1st, 8th, 14th, 21st and 29th and September 6th. The next largest (now in same skin) moulted for the 6th time this morning.

These larvae appear to require a meal of the *Alga* first, but after that they will reduce the oak and sallow leaves to mere skeletons.

Dr. E. A. Cockayne exhibited living larvae of *Bankia argentula*, *Plusia festucae*, and *Triana tridens*, from Wicken Fen ova, and of *Venusia cambrica*, *Odontopera bidentata*, *Opisthograptis luteolata* (green and brown forms), *Eupithecia exigua*, and *Viminia euphorbiae*, from East Aberdeenshire ova. He also showed a *Pezomachus* sp. from a *Phytonomus* (beetle) cocoon on Hemp Nettle.

Mr. S. Wakely exhibited—1. Larvae and imagines of *Goniodoma limoniella*, Stt., with the stems of Sea Lavender in which the larvae had pupated showing emergence holes.

2. Larvae of *Leucoma (Porthesia) similis* from the Isle of Wight, *Orgyia gonostigma* from Warley ova and *Cosymbia pendularia* from West Wickham.

3. A box of 19 species of lepidoptera taken at the Mickleham field meeting, including series of *Philereme rhamnata*, *Boarmia ribeata (abietaria)* and *Pterophorus galactodactylus* bred from larvae collected there.

Mr. T. Eagles exhibited larvae of *Hipparchus papilionaria*, *Hylophila bicolorana* and *Cosymbia linearia* from Epping; *Orgyia gonostigma* from Brentwood, and ova of *Polia chi* from Asbendon, Oxon.

Mr. W. H. Storey exhibited larvae of *Agrotis ashworthii (candelarum)* from N. Wales.

Mr. J. A. Downes exhibited a box of lepidoptera including a striated aberration of *Polyommatus thetis (adonis)*, a cocoon of *Plusia festucae* on a sedge leaf and pointed out the difference between the bending of the leaf by a spider and by the larvae of *P. festucae*. He also showed larvae of the following species:—*B. ribeata (abietaria)*, *Eremobia ochroleuca*, *Pygaera bucephala*, *Stauropus fagi*, *Notodonta dromedarius*, *Lophopteryx camolina*, *Mimas tiliae*, (a red-spotted form), *Pheosia dictaeoides*, *Cerura furcula*, *Craniophora ligustri*, and a young larva of *Lasiocampa quercus*.

Mr. H. Dolton exhibited larvae of *Chimabache fagella*, *Toxocampa pastinum*, *Gastropacha quercifolia*, *Habrosyne pyritoides* (derasa), *Pheosia tremula* (dictaea), *Lophopteryx camelina*, and *Acrionicta megacephala* from Reading.

Mr. W. L. Rudland exhibited a larva of *Stauropus fagi* from Reading.

Mr. T. H. L. Grosvenor exhibited representative specimens of European *Zygaenidae*, which he subsequently presented to the Society.

Mr. MacNulty exhibited larvae of *Dianthoeia cucubali*, *Cilix glaucata*, *Drepana lacertinaria*, *Ligdia adustata*, *Biston betularia*, *Gonodontis bidentata*, *Hylophila prasinana*, and ova and pupa of *Psilura monacha*.

Mr. G. de Worms in remarking on the season pointed out that Folkestone had been very good for *Polyommatus thetis* (bellargus); he recorded two *Limenitis sibilla* ab. *nigrina* from the New Forest, where *Dryas paphia* was late, and that in Kent and Sussex *Colias croceus* was fairly plentiful but *Pyrameis cardui* was not so.

Mr. Ennis recorded two ab. *helice* from the I. of Wight where he had found *Colias croceus* fairly common.

Dr. G. V. Bull reported *Pyrameis atalanta* as frequent in West Kent.

Mr. J. A. Downes, speaking of the Lewes district, mentioned *C. croceus* as fairly plentiful, *P. cardui* and *P. atalanta* also in fair numbers, one *Polygonia c-album*, and an abundance of *Plusia gamma*.

Mr. C. N. Hawkins stated that while the *Palimpsestis* or exhibited by him, had a band of unpigmented scales across the tornus, a specimen similar in appearance taken by Mr. S. Wakely, though exhibiting the white band, had the scales composing this area definitely pigmented.

SEPTEMBER 22nd, 1932.

The PRESIDENT in the Chair.

The President exhibited a large number of *Zygaena stoechadis* bred from the egg. Examples showing five spots, six spots and intermediates were obtained from both six and five spot forms. The larvae hibernated as a rule, sometimes a second and even a third year. In one case a larva was hibernating for the fourth year. But he had obtained imagines in one year and in one case a second brood was produced in the year.

Dr. Cockayne exhibited larvae of *Dasychira fascelina*, *Acrionieta psi* and *A. tridens* pointing out their distinctions, *A. strigosa* both brown and green forms, and of *Pheosia dictaeoides*, from I. of Arran ova. In the last the young larvae had the habit of strangling themselves, and he had lost most of them.

Mr. Eagles exhibited larvae of *Bupalus piniaria* and of *Agrotis strigula* taken at the Field Meeting at Westerham, on August 10th.

Mr. Robert Adkin exhibited a series of *Plutella maculipennis*, Curt. (*cruciferarum*, Zell.) (The Diamond-backed Moth) and read the following note:—Of this species Meyrick says, “truly cosmopolitan, the most universally distributed species of the *Lepidoptera*, occurring everywhere and ascending to above 12,000 feet.” Yet what do we know of its life history, how does it pass the winter? In Britain it is of very fitful occurrence, in some years being very scarce, in others very abundant, occasionally to such an extent as to be a serious pest on some of the *Cruciferae*, especially turnips, which the larvae impoverish by devouring the leaves. In the years when it is abundant one usually meets with the moth in comparatively small numbers at about the end of May or early in June, thence forward it seems never to be absent throughout the summer and becomes most abundant in early Autumn—August and September. It may be that the species does not winter in this country and that we are dependant for our supply upon spring immigrants, it is however difficult to get direct evidence on this point with so small an insect, but it is significant that some of the years when this species has been abundant, coincide with those in which known migrant species have also been abundant. I have looked up such references as I have been able to obtain in our text-books, journals and works on Economic Entomology, in the hope of finding some reference to the question of how the species passes the winter, but without result. So I turn to America, where Economic Entomology is regarded as a study of first importance, and in two books published within quite recent years, the one written by two Professors of Entomology of Illinois, the other by equally well-placed people of West Virginia, and this is what I read. In one, “the small greyish moths winter hidden away under the remnants of the cabbage crop left in the field.” In the other, “In the winter the cocoons containing the pupae are found on old cabbage stalks in the field or on stored cabbage.” It is difficult to reconcile two such diametrically opposed statements, especially when made by men working in similar climates, although hundreds of miles apart,

and one can only conclude that there must be a mistake somewhere. But a following paragraph may, I think, throw some light on the whole question, it is, "Two or three generations a year occur in the more northern states and four or five further south, while in the extreme south it may be found active practically throughout the year." If this be so, it appears to suggest that the species can exist continuously only in a climate where it can go on breeding all the year round, and in that case we in Britain must be dependant for our supplies upon immigrants from some more genial climate. It is an interesting question; is it too much to hope that some of our younger members, with keen eyesight and powers of close observation, may be able to determine whether this species does pass the winter in this country in any stage?

Dr. Bull exhibited a short series of *Polyommatus thetis* (*bellargus*) showing various aberrations of the underside marking, from Folkestone; with larvae of *Boarmia roboraria*, *Opisthograptis luteolata*, and *Plagodes dolabraria*, all from West Kent. He also reported meeting with *Colias croceus* at Tenterden on September 15th.

Mr. Howarth exhibited the following larvae from Bookham:—*Drepana falcataria*, *D. lacertinaria*, *Notodonta dromedarius*, *N. ziczac*, *Hadena pisi* and *Cosymbia punctaria*.

Mr. S. Wakely exhibited a case of 81 different species of Lepidoptera taken at various field meetings of the Society during 1932. Many of the species had been bred from larvae taken on those rambles. Insects of note were, a blue specimen of *Pseudoterpna pruinata* (Brentwood); *Erastria fasciana*, *Perinephele lancealis*, *Myelois neophanes*, *Evetria pinicolana*, *E. pinivorana*, *Depressaria conterminella*, and *Cedestis gysselella* (Groombridge); *D. sannio* (*russula*) and *Meliphora grisella* (Forest Row); and *Lithosia deplana*, *Sarothripus revayana* (*undulana*), *Alucita niveidactylus* (*baliodactylus*), *Phycis dilutella* (*adornatella*) and *Anacamptis vorticella* (Boxhill). A specimen of *Arctia caja* with forewings much darker than normal, very little of the creamy ground showing, and with black spots joined in a bar on hind wings, taken at Walthamstow in July, was also shown.

Mr. K. G. Blair exhibited some stem-borers of *Eupatorium cannabinum*, and read the following note:—"Early in, July, 1923 near Tenby, Pembrokeshire, I noticed several young stems of *Eupatorium cannabinum* (Hemp Agrimony) wilted and drooping and suspected the presence of larvae of *Gortyna flavago*, which was

treating foxglove stems in a similar manner; but on opening up some of the stems the larvae causing the trouble proved to be those of a beetle. Several sections of stem were taken in the hope of rearing the beetle but without result and unfortunately none of the larvae were preserved and no attempt was made to identify them more precisely. Since then I have kept a watch on the plant in various localities but have never again come across similar damage. However in April last near Seaton, S. Devon, I was examining some of last year's dead stems of the plant, the new stems being not yet grown up, and discovered some Lepidopterous larvae that had evidently fed in the pith, causing slight swellings at the upper nodes of the plant and having hibernated there, were then awaiting pupation. They were, however, very heavily parasitised, so that from some half-dozen larvae collected only one moth emerged (May 22nd). This was the plume *Marasmarcha microdactyla* (see Buckler, "Larvae of Brit. But. and Moths," Vol. IX, pp. 370-372, pl. CLXIV. fig. 5.) Three species of *Braconidae* were reared from these larvae. Buckler cites *Apanteles adjunctus*, Nees, *A. falcatus*, Nees, and *A. albipennis*, Nees, from this species.

"Being again at Tenby in the early part of this month I searched the *Eupatorium* in an endeavour to solve the riddle of nine years ago. The plant was now fully grown and beginning to die off, but I could find no drooping or wilted stems. *Marasmarcha* larvae were plentiful mainly at the nodes, but sometimes in the internodes; they were already full grown and preparing to hibernate before pupating, each having an open round hole prepared for the exit of the moth.

"Though several stems were split no other borers were found. Turning then my attention to the old stems of last year lying among this year's growth I soon found some with long slender galleries in the pith and following these along found some small beetle larvae. The lower part of these old stems was usually moist and hollow, the pith having completely gone. This part of the stem usually contained woodlice, earwigs or spiders, but in some of them would be blocked by a plug of fibres closely packed, with a clear hollow space above it, and in this space would be found a well-grown larva apparently of the same species as the pith-miner last mentioned. In many cases this clear space would extend right up to the pith, but sometimes would be cut off above, at a distance of about 10 inches from the lower plug, by a second and similar plug of packed fibres. This larva appears to be that of *Oedemera nobilis*.

"One such larva was found with an ectoparasitic larva attached

to it and lying just above the lower plug. An elongate whitish cocoon with a very dense woolly covering found in some of the stems belongs possibly to the same species.

“Another probable parasite of the young *Oedemera* larva is represented by a few pale yellowish indurated skins, but the nature of the parasite is still in doubt.”

Further insects found in the same stems were:—

A small lepidopterous larva with Rhogadine parasite.

The Cossonine weevil *Caulotrypes aeneopiceus*, two or three being found together in a stem, feeding upon the pith; this species I have previously taken only in more solid wood, old gorse stems, ivy, etc.

Dipterous puparia, perhaps *Agromyza aenea*, Mg., recorded by Kaltenbach as a stem-miner in this plant.

An elongate egg of a locustid grasshopper. (?)

“A pupa of *Depressaria* sp. The larva had no doubt entered this stem to pupate instead of that of an Umbellifer (? *Oenanthe crocata*) growing close by. This pupa subsequently produced a *Pezomachus* sp. ♀.

“Three spp. of *Ichneumonidae* which may merely have entered for hibernation, though possibly one of them may be the parasite of *Oedemera nobilis* mentioned above.”

Mr. Ennis exhibited larvae taken by him at Westerham:—*Eupithecia castigata*, *E. expallidata* (golden-rod), *Euphyia corylata*, *Dasychira pudibunda*, *Lophopteryx camelina*, etc.

It was reported that a larva of *Manduca atropos* had been found, and that *Ochria aurago* and *Xylina socia* had been taken at sugar.

OCTOBER 13th, 1932.

ANNUAL EXHIBITION MEETING.

This Meeting is now quite informal. Exhibits are placed on tables and benches and those attending the meeting circulate in the room. Light refreshment and chairs are provided in a section of the hall. There was an error in holding the meeting a fortnight earlier than usual, which no doubt caused the attendance to be somewhat less than of late years, but the exhibits were as varied and as interesting as usual.

Mr. R. Adkin exhibited the British *Sarrothripinae*; *Chloëphoridae*; and *Nolidae* (Lep.).

Mr. Arthur Bliss exhibited a ♀ *Zephyrus quercus* with the usual purple blotch on forewing nearly absent.

Mr. A. W. Buckstone exhibited aberrations of the following British butterflies:—*Melanargia galathea*, *Pararge aegeria*, *P. megera*, a white female, Dorking, August, 1932, *Aphantopus hyperantus*, *Polyommatus thetis*, *Adopaea flava (thaumas)*, *Arctia caia*.

Mr. E. J. Bunnett exhibited a series of hand coloured photographs of the larva of several species of British Lepidoptera.

Brig.-General B. H. Cooke exhibited cabinet drawers containing fine series of the European races of *Polyommatus (Agriades) coridon* and of *P. (A.) meridionalis*.

Mr. S. R. Ashby exhibited the following introduced species of Coleoptera.—

A living specimen of a Californian Ladybird *Coccinella transversogattata* v. *californica* taken at rest on an American Apple (Gravenstein) at Pinner, September 28th last.

Another Californian Ladybird, *Coccinella trifasciata* var. *juliana*, taken in a City restaurant, May 6th, 1908.

Two specimens of a Longhorn Beetle *Neoclytus erythrocephala* from American Maple.

A European Longhorn *Hesperophanes griseus* taken on the wing in Lewisham Road by the late Mr. W. West in 1869.

Two examples of a W. Indian Longhorn Beetle, *Elaphidion spinicorne*, from imported timber taken at Messrs. J. Penn and Sons works at Greenwich in 1878.

A Barmese Longhorn *Diaxenes dendrobii*, taken in a greenhouse at Reading, by the late Mr. W. E. Butler.

Two examples of the North American Longhorn *Monohammus titillator*. One cut out of timber at Messrs. Penn's works in 1876, the other taken alive in Cannon Street, City, September 11th, 1929 by our Hon. Secretary, Mr. S. N. A. Jacobs.

Two *Bostrichidae* beetles, the N. American *Xylobiops basilare*, from timber at Messrs. Penn's works in 1878, and an Indian species *Heterobostrychus aequalis*, taken by Mr. Stanley Edwards in a City tea store in 1898.

The specimens from Messrs. Penn's works were all taken by the late Mr. William West of Greenwich.

Several specimens of an *Ipidae* beetle, *Coccotrypes dactyliperda*, F. from date-stones, taken alive at Wembley, Middlesex, October 30th, 1920 with three stones showing the borings and beetles *in situ*. These were identified by Mr. K. G. Blair. The species being a native of Arabia and Persia, has been introduced into several European countries with produce.

Mr. E. Rivenhall Goffe (a visitor from the Entomological Society of the South of England) exhibited a series of females of *Tabanus miki*, Brauer, (Diptera, *Tabanidae*), from various localities in the New Forest, Hants., together with short series of *Tabanus bromius*, Linn. and *Tabanus cordiger*, Wied. for comparison, and drawings of the frontal callus of each species.

Attention was drawn to the fact that *T. miki* and *T. cordiger* had unbanded eyes, but that the eyes of *T. bromius* bore 1 band each; these eyebands however disappeared as the insect dried after being killed. In life therefore *T. miki* could only be confused with *T. cordiger*, which had a very distinct frontal callus of quite a different style. After killing and drying however *T. miki* could easily be confused with *T. bromius*, but could be distinguished by the distinctly wider interval between the lower callus and the margins of the eyes.

T. miki was added to the British List in August, 1930, vide "Trans. Ent. Soc. S. of Eng.," VI. 81-83 (1930), 1931.

Dr. G. V. Bull exhibited series of *Pachygastris trifolii* from Romney Marsh, including 2 ♀s with cross lines and shading absent from forewings. This appears to be the ab. *iberica*, Gn. An *Abraxas grossulariata* with very little black and no marginal spots on hindwings; Herts, bred 1932. *Palimpsestis* or with costa and lutestring areas dark and pale outer margin to forewings. This form is probably near *fasciata*, Splr.

Mr. O'Farrel exhibited a collection of Lepidoptera taken in the Lizard and Helston district of Cornwall in the summer of 1932, including a series of *Melitaea aurinia*, an example of *Phryxus livornica* (June 13th), *Nola strigula*, 4 *Chlorissa* (*Nemoria*) *viridata* and a *Boarmia jubata*. The last three species are apparently only very rarely recorded from Cornwall. *C. viridata* was well distributed but scarce, and *M. aurinia* was very local but abundant where found.

Mr. J. A. Downes exhibited a series of *Polyommatus* (*Agriades*) *thetis* (*bellargus*) including a very fine ab. *striata* from Sussex in August, 1922. Two series of *Aphantopus hyperantus* from Dorking and Ashdown Forest. The specimens from Dorking district, have small spots, and ab. *caeca* is not uncommon. The other series was bred this year from ova laid by specimens with tendencies to ab. *lanceolata*. Compared with the Dorking specimens, all have very large spots, and often extra ones, but all the spots are round, i.e., they have no tendencies to ab. *lanceolata*.

Mr. T. R. Eagles exhibited a halved gynandromorph of *Pachygastris trifolii*, bred from a larva collected at Dungeness, Kent, by Dr. G. V. Bull.

Mr. Eldon Ellison exhibited a collection of butterflies from the Lebanon of about 120 species including *Parnassius mnemosyne* ssp. *libanotica*, *Synchloë callidice* ssp. *chrysidice*, *Anthocharis damone* ssp. *syra*, *Melitaea collina*, *Satyrus pisidice*, *S. pelopea*, *Heodes thetis* ssp. *zahaltensis*, *H. asabinus*, *Virachola livia*, *Nordmannia myrtale*, *Tomares nogelii*, *Plebeius eurypilus* ssp. *euaemon*, *Polyommatus loewii*, *P. candalus* ssp. *isauricoides*, *P. isaurica* ssp. *dorsum-stellae*, *Aricia chiron* (*eumedon*) ssp. *mylitta*, *A. ellisoni*, *Hesperia serratulae* ssp. *alveoides*, *Adopaea hyrax*, *Erynnis pallida*, *Parnara zelleri*, and several species still unidentified with certainty.

Mr. Chas. de Worms exhibited a pair of *Limenitis sibilla* ab. *nigrina*, New Forest, July, 1932; short series of *Coenonympha tiphon* ssp. *philoxena* chiefly underside variations, Witherslack, June, 1932; a few aberrations of *Polyommatus (Agriades) coridon*, and *P. (A.) thetis* (*bellargus*) from Kent and Surrey, August, 1932; series of *Agrotis cinerea* and *Dianthoecia albimacula*, Kent coast, June, 1932; *Leucania albipuncta*, *L. brevilinea*, and *Madopa salicalis* all taken this year; a ♂ *Hyloicus pinastri* found at rest, Dorset, July 4th, 1932; and a series of *Pachetra leucophaea* and *Siona lineata* (*dealbata*), Kent, June, 1932.

Mr. N. G. Wykes exhibited *P. (A.) coridon* ab. *fowleri* and one approaching that form; ♂ and ♀ *Hipparchia semele* with lower spot on forewing very small; very pale *Hamearis lucina* ab. *leucodes*; a black *Nylophasia monoglypha* ab. *infuscata*; a reddish *Charaëas graminis* ab. *rufa*; a very dark *Agrotis vestigialis* ab. *nigra*; a dark *Stauropus fagi* ab. *obscura*; and other aberrations. He also exhibited drawings of the larvae and imago of *Hyloicus pinastri*; of *Aphantopus hyperantus* ab. *lanceolata*; *P. coridon* ab. *fowleri*; Irish forms of *Pieris napi* ♂ and ♀; etc.

Messrs. Downes, Ennis and McNulty exhibited series of *Erannis (Hybernia) marginaria*, *E. (H.) leucophaearia*, *Apocheima hispidaria* and *Phigalia pedaria* to show the melanic tendency of these species and with other variations for the sake of comparison. All specimens were taken in either Richmond Park or Wimbledon. There were included an almost fully black form of *A. hispidaria*, ab. *monacharia* of *P. pedaria*, ab. *marmorinaria* and ab. *merularia* of *E. leucophaearia*.

Mr. A. de B. Goodman exhibited a series of specimens selected in

an endeavour to show almost constant tendency in degree of melanism in different species of the genus *Parnassius*, Latr.

Throughout the genus melanism is commoner in the female sex and in fact practically every female shows a suffusion of the black scales to a greater or less degree. On the other hand melanic males are rare and it was surprising therefore to find that the most extreme forms in *imperator*, *hardwickii*, *delphius* and *actius* were males.

1. *imperator*, ♀ typ., ♀ melanic, ♂ melanic.
2. *hardwickii*, ♂ typ., ♂ intermediate, ♂ melanic.
3. *mnemosyne*, ♀ typ., ♀ intermediate, ♂ melanic.
4. *delphius*, ♂ typ., ♂ intermediate, ♀ melanic.
5. *actius*, ♂ typ., ♂ intermediate, ♂ melanic.
6. *apollo*, ♀ typ., ♀ intermediates, ♀ melanic.

Mr. T. H. L. Grosvenor exhibited series of *Zygaena jilipendulae* (*stoechadis*) illustrating the results of his recent breeding experiments.

A. 6-spot ♀ from La St. Baume (wild taken). 10—5-spot; 10 intermediate; 11—6-spot.

B. Intermediate ♀ from Digne (wild taken). 6—5-spot; 1 intermediate (7 only bred).

C. 5-spot ♀ from Digne (wild taken). 4—5-spot (4 only bred).

D. Intermediate ♀ from Digne (wild taken). 16—5-spot; 16 intermediate; 24—6-spot.

E. 6-spot ♀ from Digne (wild taken). 2nd emergence. 14—5-spot; 3 intermediate; 12—6-spot. Normal emergence. 10—5-spot; 2 intermediate; 7—6-spot.

F. 6-spot ♀ from Bignasco (wild taken). Normal emergence. 26—6-spot. 2nd hibernation. 32—6-spot.

G. 5-spot ♀ from Boscolungo (Tuscany), 7—5-spot; 7 intermediate; 4—6-spot.

Result of pairing Yellow × Red Aberrations:—1930—40 red = 100% red. 1931—15 red = 71·42% red; 6 yellow = 28·58% yellow. 1932—35 yellow = 100% yellow.

The Colour Aberrations were—orange forms, orange red forms, grey pink forms, brick red forms, carmine forms.

Other forms of Aberration were—Confluence. Spots small, racial at Felbridge, Sussex. Spots large, general. Spot 6 small and elongated, prevalent Three Bridges. Large size, general. Small size, general (some years prevalent). Spot 6 very small almost absent, nearest approach to *stoechadis* in Gt. Britain, hind wing borders suffused markings unequal.

CROSS PAIRINGS AND LOCAL RACES—

A. 6-spot, Bexley ♂ (bred) × 5-spot ♀ St. Baume (bred), produced 1—5-spot; 8 intermediate; 7—6-spot.

Pairings of above as under.

B. 6-spot ♂ × 6-spot ♀ produced: 1st year 4—5-spot; 8—6-spot. 2nd year, 1—5-spot; 2—6-spot. 3rd year, 2—5-spot; 1 intermediate.

B. 5-spot ♂ × 5-spot ♀ produced: 2nd emergence, 1 intermediate. 1st year, 6—5-spot; 4 intermediate; 6—6-spot. 2nd year, 1—6-spot.

C. 5-spot ♂ Digne (bred) × 6-spot Bignasco (bred) produced: 2nd emergence 1—6-spot. 1st year, 13—5-spot; 5 intermediates; 13—6-spot. 2nd year, 1—5-spot; 2—6-spot.

LOCAL RACES.—Tuscany, Italy—Austria—Turkey—Spain, and Argyle and Austria, comparison to show hairy body of former and metallic scaling on the body of the latter two races.

Mr. E. J. Hare exhibited a series of *Crymodes exulis*, and a short series illustrating local forms of *Noctua festiva*, taken in Shetland, July, 1932.

Mr. J. L. Henderson exhibited *Phyllobius artemisiae*, Desbr., a recent addition to the list of British Coleoptera. This species was originally described from examples found in the Alps, occurring on a species of *Artemisia*. In Britain it has only been recorded from the Kent coast, on the sea wormwood (*Artemisia maritima*), and for comparison *Phyllobius pyri*, L., with which the above has apparently been confused.

Mr. C. N. Hawkins exhibited a number of preserved larvae including *Lasiocampa quercus*, L.; *Macrothylacia rubi*, L. (forms); *Cosmotriche (Odonestis) potatoaria*, L. (forms); *Poecilocampa populi*, L. (pale form); *Eriogaster (Lachneis) lanestris*, L.; *Trichiura crataegi*, L. (forms); *Notodonta ziczac*, L. (forms); *Pygaera (Clostera) curtula*, L. (forms); *P. pigra*, Hufn. (*reclusa*, F.); *Abrostola triplasia*, L.; *A. tripartita*, Hufn. (*urticae*, Hb.), (forms); *Thyatira batis*, L.; *Habrosyne (Gonophora) pyritoides (derasa)*, L.; *Lyncometra ocellata*, L.; *Epirrhoë galiata*, Schiff.; *E. alternata*, Müll. (*sociata*, Bork.); *Coremia (Ochyria) spadicearia*, Schiff. (*ferrugata*, Stdgr.) and *Anticlea nigrofasciaria*, Gz. Also imaginal vars. of *Palimpsestis or*, F.; *Thera obeliscata*, Hb. and *Xanthorhoë fluctuata*, L.

Mr. H. A. Leeds exhibited the following aberrations of British Butterflies all captured wild in 1932.

Colias croceus, ♀ *helice*.

Strymon pruni, ♂ underside, band on left hindwing yellowish-orange. ♀ upperside, orange marking, black spot and bluish-white inner metallic streak of underside border, reproduced on upperside of both hindwings, in second division. (Homoeosis).

Polyommatus coridon, ♂ upperside, ab. *fowleri*. ♂ underside, *pallidula-obsolata*.

P. icarus, ♂ undersides, *sinistro-I-nigrum*, *dextroarcuata*, *costajuncta-semibasijuncta*; and *obsolata*. ♀ upperside, *supracerulea*. ♀ undersides, *anticotransiens*, *-posticoobsolata*, and a very heavily marked *basijuncta*.

P. aegon, ♂ uppersides, very broad whitish-blue band interior to outer border of forewings, another white veined and two with considerable area of wings bleached. ♂ undersides, border chevrons large on forewings, and another with chevrons only faintly indicated; and one with a broad and well elongated black streak in basal area of each forewing. ♀ upperside with bleached patches in borders of left forewings and consequent fading in colours of lunules. ♀ underside, *partinflavescens*.

Rumicia phlaeas, ♀ *radiata*, and another bleached all over.

Adopaea flava. ♂ upperside, golden-ochreous ground.

Coenonympha pamphilus, ♂ upperside, symmetrically marked with bleached patches on all wings. ♀ upperside, hindwings bleached. ♀ underside, left hindwing very pale and submarginal band absent.

Mr. A. M. Morley exhibited the following aberrations of British Lepidoptera. Of *Polyommatus thetis* (*bellargus*), 4 upperside colour varieties, an ab. with elongated spots on hindwings, an ab. with the discoidal on forewing missing, with ab. *arcuata*, ab. *digitata*, ab. *obsolata*, etc. Of *P. icarus*, ab. *obsolata*, and ab. *arcuata* + *basijuncta* + *costijuncta*. Of *Plebeius* (*Aricia*) *medon* (*astrarche*), ab. with underside ocelli practically absent. *Senta maritima* v. *wismariensis* from N. Kent. *Leucania favicolor* ab. *rufa*, N. Kent. *Hadena* (*Polia*) *dissimilis* ab. *w-latinum*, the brownish grey form and not our usual leather brown form *suasa*. *Catocala sponsa* from Dungeness. *Hipparchia semele* ♂ with the eye spots on upperside restricted to the apical one on the forewing. The *equestraria* form of *Ennomos quercinaria*. *Hydroecia paludis*. *Synanthedon andrenaeformis* with a stem of viburnum showing pupa and pupa case, etc.

Mr. L. W. Newman exhibited—1. Long series of *Abraxas grossulariata* ab. *varleyata* showing extreme abs. *radiata*, etc., and two curious asymmetrical specimens one side ab. *radiata* and the other black. All from Barnsley stock.

2. Long series of *Pieris napi* showing four albino forms, an extremely heavily spotted ♀ and numerous banded forms. Also a gynandromorph.

3. A series of *Polyommatus thetis* from Folkestone with considerable variation.

4. Aberrations of various species including *P. coridon*; *Brenthis euphrosyne*; *Melampias aethiops*; *Dryas (Argynnis) paphja*, etc.

Mr. C. G. Priest exhibited a series of *Cosmotriche potatoaria* showing the Hants and Kentish forms.

Mr. J. F. Perkins exhibited *Euchloë cardamines* ♀ with an orange streak on the right forewing.

Epinephele jurtina, underside with streaks of forewing coloration on the left hindwing. Homoeosis.

Rumicia phlaeas underside with streaks of forewing coloration on both hindwings (bred, 1932). Homoeosis.

Zygaena filipendulae with the lower of the middle pair of spots extremely small.

E. jurtina, from Co. Wicklow, with the left forewing with the fulvous replaced by white, the right forewing being normal.

Mr. S. G. Castle-Russell exhibited:—*Papilio machaon*.—2 males with spots nearly obsolete on margin of lower wings. Norfolk. 1 male with abnormal amount of black coloration.

Argynnis adippe, L.—A male with upper wings almost completely suffused with black. New Forest, July 21st, 1932.

Brenthis euphrosyne, L.—A strikingly aberrant form, New Forest, 1930.

Melitaea aurinia, Rott.—A gynandromorph, the right side wings being female and the left male. Carlisle, June, 1931.

Aphantopus hyperantus, L.—A curious diaphanous form, New Forest, 1932.

Epinephele jurtina.—A female with bright orange bands on the lower wings simulating the Irish forms. New Forest, July, 1932.

Euchloë cardamines, L.—A gynandromorphous specimen. The left wings almost typical male: the right wings typical female but with a narrow orange streak at tip. Taken by E. Rivenhall Goffe, Harewood Forest, May 25th, 1929.

Mr. Castle-Russell on behalf of the Rev. J. N. Marcon, examples of various aberrations of British butterflies, including the following remarkable specimens captured by himself.

Agriades thetis (bellargus), Rott.—A gynandromorph, left side wings completely male, right side wings completely female, a truly halved example. Folkestone, September, 1932.

Melanargia galathea, L.—1. A gynandromorph, left side typical ♀, right side typical ♂, a truly halved specimen, unique as regards British records. Cotswolds, 1932.

2. A specimen heavily dusted with black, giving the wings an appearance of smoky grey. Lulworth, 1929.

Mr. G. B. Russell exhibited a selection of moths taken in the very localised area of the grounds of "Scar-bank House," Swanage, Dorset, mostly during 1932.

Mr. E. Scott exhibited a series of *Erebia stygne* form *bejarensis* from Vernet-les-Bains, Pyrenees; *Brenthis aphirape* a recent discovery in the Pyrenees; and an aberration of *Coenonympha pamphilus* from Norfolk.

Mr. A. Simmonds numerous series of Rhopalocera from Spain and S. W. France.

Mr. F. Stanley Smith exhibited a short series of *Leucania vitellina* taken on the Dorset coast this season.

Mr. Stanley Smith also exhibited his light-trap for moths of which the description is given ante p. 46.

Mr. Hy. J. Turner exhibited a collection of Rhopalocera, about 50 species, from West China, showing the predominance of Palaearctic Faunal influence with only a slight infusion of species indicative of the Oriental Region.

Mr. S. Wakely exhibited the Lepidopteron *Aphomia gularis* from the London area, a recently introduced species.

Mr. Clifford Wells exhibited numerous aberrations of British Butterflies caught in 1932 including a superb melanic *Brenthis euphrosyne*.

Mr. Harold B. Williams, LL.D. exhibited a *Rhodometra* (*Sterrha*) *sacra* ♂, taken in West Sussex (E. of Worthing) 23.viii.1932.

Apatela aceris ab. *candelisequa*, Esp., taken in St. John's Wood, 27.vi.1932.

Boarmia rhomboidaria ab. *haggarti*, Williams, bred in 1932.

Agriades (*Polyommatus*) *coridon*, including ab. *fowleri* ♂ taken in West Sussex. August, 1932.

A. (P.) thetis ab. *antico-obsoleta*, Tutt, and a ♀ approaching ab. *cinnus*, r. side, ab. *partim-radiata*, l. side.

Epinephele jurtina ♀, one an ab. *pallida* hindwings and one with apical spots minute. W. Sussex, August, 1932.

Mr. Worsley Wood a bred series of *Eupithecia extensaria* from Norfolk, 1932.

Mr. Hugh Main exhibited a number of living spiders with their webs made in captivity.

Lt. E. B. Ashby exhibited a small collection of *Zygaenidae* from Mouthier, Doubs, France, the Neuropteron *Osmylus maculatus* also from France and the following British Hymenoptera: *Mellinus arvensis*, *Crabro chrysostoma*, *Crabro cribrarius*.

Mr. M. Niblett exhibited a large collection of Cynipid galls and numerous species of *Cynipidae* causing galls, including species with alternating generations

Mr. Allen M. Low exhibited a collection of the British *Syrphidae* and various species of British *Stratiomyidae*, etc.

OCTOBER 27th, 1932.

The PRESIDENT in the Chair.

Mr. F. J. Griffin, of S. Kensington, was elected a member.

Mr. Newman exhibited a series of so-called "gynandromorphs," which are being sent out from sundry localities. Others were reported from the same origins.

He then gave a short resumé of his experiences in the field and of his breeding during the season of 1932, remarking on the season that it was the worst for Butterflies in his experience.

Many species were very late in N. Kent and those usually common were absent or scarcely represented. Of *Argynnis aglaia* for instance only one was seen. The Taeniocampids, usually so common at sallow, were extremely scarce. The larvae of *Zephyrus quercus* were very scarce as also were those of *Arctia caja* and there were no *Arctia villica*. As a rule certain spots produced these in abundance. *Cosmotriche potatoaria*, on the other hand was as common as usual. The first brood of the Pierids was scarce. The last seven seasons *Colias croceus* has occurred at Bexley in the spring sometimes in fair number, this year only one was seen. *Polyommatus coridon* was fast disappearing in N. Kent, due he thought to the attacks of parasites, as of the larvae he collected quite 50% were stung. At Oxford in Bagley Wood and at Tubney he saw only two *Brenthis euphrosyne* in three days, and a friend took three only. He noticed that the oak trees usually so largely attacked by *Tortrix viridana*, had this year not suffered at all. On one occasion in 2 hours work he only got 12 larvae including one *Zephyrus quercus* and two *Asteroscopus cassinea* (*sphinx*). Near Bexley however he at times found plenty of larvae. The 1st brood of *Polyommatus thetis* was fairly abundant and the 2nd brood were in thousands. *Vanessa* larvae were quite

abundant at Folkestone but in September were quite young, e.g., *Aglais urticae*. *Pyrameis atalanta* larvae were plentiful but not so abundant as last year; they were only half fed at the end of September. Last year some 90% were parasitized, this year about 5%.

Dr. E. A. Cockayne exhibited a series of *Eupithecia extensaria* bred this year from its Norfolk locality. The variation was normally very slight but a few examples had whitish very emphasised lines. Two specimens had a yellowish tinge.

Mr. Hy. J. Turner exhibited a postcard published by the British Museum reproducing a remarkable figure of *Saturnia paronia* which was executed by a Frenchman, Jacques le Mayne before 1588 as a water colour.

Mr. S. R. Ashby exhibited the following species of local Diptera, which had been presented to the Society's Collections.—*Tabanus sudeticus*, Zell., *T. cordiger*, Wied., *T. glaucopsis*, Meig., and *T. miki*, Brauer., with four forms of *Chrysops quadratus*, Meig., f. *quadratus*, Meig., f. *intermedius*, Goffe., f. *pictus*, Meig., and f. *lineatus*, Goffe.

Dr. Bull exhibited an *Epirrhoë alternata* (*sociata*) with the band on the L. forewing twice as wide as that on the R. forewing. He also reported the occurrence of *Polygona c-album* at Northiam on August 23rd and at Beneden on October 15th.

Mr. Robert Adkin exhibited a series of *Epunda lichenea*, Hb., taken at light in his garden at Eastbourne in September last and the early part of the present month. Referring to his former exhibit of this species and the remarks that he then made (Proc. 1931, p. 98), he said that although in 1931 he took only seven specimens, during the present autumn and with the aid of a more powerful trap, he had obtained upwards of thirty, all males.

Mr. de Worms noted that he had met with the species at Swanage near about midnight or later at light.

The President said that the nearly related *Aporophyla lutulenta* occurred after 2 a.m. in hundreds on Reigate Hills.

Miss W. M. A. Brooke exhibited a series of coloured drawings and details of various species of Sea-anemone from N. Ireland.

Mr. S. Wakely exhibited a living larva of *Pararge aegeria* bred from ova laid by an Isle of Wight female; also imagines of three "pugs" bred from a bunch of Clematis bloom picked at Reigate, the species being *Chloroclystis coronata*, *Gymnoscelis pumilata*, and *Tephroclystis haworthiata* (*isogrammaria*).

Mr. Hawkins exhibited bred *Aspitates gilvaria* showing crossband

and much speckling; a larva found in a potato, probably that of a click beetle, and pointed out that the first pair of spiracles which were on the mesothorax in the larva were in the pupa shifted to the metathorax: also parasites from the larvae of *Epirrhoe alternata* (*sociata*) from Brading, I. of Wight. The President remarked that *A. gilvaria* was abundant in the Reigate district.

Mr. Eagles exhibited a larva of *Boarmia roboraria* from Epping and of *Plusia chrysitis* from Bayford, Herts.

Mr. Downes exhibited the larvae of *Euchloris pustulata* (*bajularia*) from Chiselhurst to show the way in which it disguises itself by a covering of pieces of leaves, bud scales, etc. He remarked that in 1930 he found *A. gilvaria* common, in 1931 he found one only, while in 1932 he saw none.

In the remarks on the season Mr. Adkin said that, at Eastbourne, of the 1st brood of *Lycaenopsis argiolus* he only saw 2 and of the 2nd brood none. Mr. Newman said that it usually swarmed with him but this year was practically absent. He also noted that *Plebeius aegon* had been disappearing gradually for some years; he saw *Pyrameis cardui* in early June and of the 2nd brood only 3 at Folkestone. It was reported that on the Purbeck Hills *Argynnis aglaia* was pretty common, that *Eugonia polychloros* had occurred at Ashford, and that only odd specimens of *P. cardui* had been seen anywhere. Dr. Joy said that at Reading he had gathered 1611 larvae of *Pieris brassicae* on some 70 cabbages. Mr. Newman had noted a 3rd brood of this species in mid-September. An abnormal number of specimens of the genus *Plusia* were noted, and at light in August and September moths were more plentiful than usual when the weather of these months is wet.

South-Eastern Union of Scientific Societies

CONGRESS held in LONDON.

June 1st-4th, 1932.

REPORT OF THE SOCIETY'S REPRESENTATIVES.

A London Congress is always in the nature of an experiment and it is to be feared that in the present case it was not a particularly successful one. The accommodation provided at the Civil Service Commission in Burlington Gardens was all that could be desired and the Programme arranged was an attractive one, but the attendance was by no means so large as might have been expected.

In a Provincial Town there is generally a strong local element; London is so vast that there is nothing of the sort, and as a consequence, although the regular members of the Union turned up in force there were few others to support them. For all that the Congress proved to be one of exceptional interest for all those who were fortunate enough to be in attendance.

Representatives' Meetings were held on the Thursday and Saturday mornings. At the former the business was largely formal and consisted chiefly in receiving and adopting the reports of the Council, the Hon. Treasurer and the various Sections. An invitation to hold the Congress in 1933 at Norwich was accepted and Prof. J. E. Salisbury, D.Sc., F.L.S., was elected President. The other Officers and Council of the Union also were duly elected.

On Saturday Dr. Tierney read his report as the Union's delegate to the Conference of Corresponding Societies at the meeting of the British Association held in the previous year in London, and Capt. Dannreuther, R.N., reported on the progress made by the Insect Immigration Committee.

The question of the necessity of Societies' Representatives being members of the Union having been raised, the Hon. Secretary explained the position, apparently to the satisfaction of the Representatives present.

Other matters that were discussed, and which received the support of the Union, were the question of fencing a portion of Lessness Woods by the London County Council; the reservation of portions of Dungeness as a bird sanctuary; sea birds killed by oil; and the preservation of ancient documents.

A suggestion was put forward that work done by the constituent societies should be reported to the Union through the various sections, it was discussed at some length and then left for further consideration at some future time; and a vote of thanks to the Civil Service Commission for the use of the meeting rooms brought the Representatives' Meeting to a close.

On the Wednesday evening the President, Dr. R. E. Mortimer Wheeler, M.C., M.A., F.S.A., having been duly inducted, read an address on "Field Archaeology in Great Britain." The retiring President, Prof. Sir J. Arthur Thomson, M.A., LL.D., was unfortunately prevented by illness from taking part in the proceedings and a lecture entitled "The Drama of Animal Life" that he should have delivered on the Thursday evening was successfully undertaken by his son.

The mornings, as is customary, were devoted to the sectional business meetings and the reading of papers, the afternoons to excursions to various places of interest.

In the Archaeological section the President, Alderman W. E. St. L. Finny, J.P., M.D., F.S.A., read an address on "Medieval Games and Gaderings" which was followed by a paper on "Prospects in Pre-History" by Mr. Reginald A. Smith, B.A. (of the British Museum): their special excursions consisting of visits to Westminster Abbey and School; Goldsmith's Hall; and Hampton Court.

The Botanists were presided over by Mr. J. Ramsbotton, M.A., O.B.E., F.L.S. (Keeper of Botany, Natural History Museum) who took for his address the subject "Fungi as Scavengers"; and Mr. A. J. Willmott, B.A., F.L.S., read a paper on "The London Flora." One afternoon they spent in the Botanical Department of the Natural History Museum under the guidance of their President, while excursions were made to Lessness Woods, to study the Flora of the Lower London Tertiaries and their Shell Beds, Mr. F. Owen Whitaker acting as leader; and to Burnham Beeches when Prof. Salisbury took charge.

Prof. H. L. Hawkins', D.Sc., Presidential Address to the Geologists was entitled "The Structure of the South-East of England" and Dr. S. E. Wooldridge, F.G.S., read a paper on "Soil and Civilisation." Their special excursions included a visit to the Fossil Reptile Gallery at the Natural History Museum; to Swanscombe to study pleistocene gravels of the Thames 100 foot Terrace; to Abbey Wood, Plumstead and East Wickham for the Chalk sections, etc., and to Charlton to view sequence of Chalk, Bullhead bed, Thanet sands, Woolwich series, and Blackheath beds.

In the Zoological section the President, Mr. Hugh Main, B.Sc., F.Z.S., F.E.S., delivered an address entitled, "The Camera as a Naturalist's Recorder;" Mr. E. J. Bedford, F.R.P.S., gave a paper on "Some Ground-Nesting Birds," and Capt. Dannreuther, R.N., further explained and reported progress made with the "Scheme for Recording Insect Immigrants." Special visits were made to the Zoological Galleries of the Natural History Museum, and to the Zoological Gardens, where Messrs. Seth Smith and Wilding and Miss Ashton acted as guides, and the President, Mr. Hugh Main, very kindly entertained the party to tea in the Fellows' private rooms.

The Presidential address in the Regional Survey section was

delivered by Mr. G. L. Pepler, F.S.I., his subject being "Town and Country Planning, and this was followed by a paper by Mrs. Ormsby on "The Prehistoric Geography of London." A Survey Walk in Westminster and Pimlico was their special excursion.

In addition to these technical excursions arranged for the benefit of members specially interested in their particular subjects, there were two General Excursions, one by steamer from Tower Pier, down the Thames and around the Docks; and the other to the London Museum where the President, who is the Keeper and Curator of the Museum, did the honours.

As already stated, the Congress in 1933 will be held in Norwich.
—ROBERT ADKIN, H. J. TURNER.

NOVEMBER 10th, 1932.

The PRESIDENT in the Chair.

Mr. S. N. A. Jacobs exhibited two aberrations of *Agrotis exclamatoris* from Ditchling, Sussex, the one being taken in July, 1923, and the other in July, 1927, both in the same garden, at sugar, and both were of exactly the same form.

Mr. Robert Adkin exhibited a series of *Fucosma semifuscana*, Steph., together with the earthen cocoons from which some of the moths had emerged. The larvae from which they were reared were collected from Sallow bushes growing on the borders of the marshes near Eastbourne in June last.

Mr. Bunnett exhibited the Coleopteron, *Scymnus capitatus*, and its larva with photographs of the same; also a photograph of lepidopterous ova on *Montbretia* and of the young larvae.

Mr. J. A. Downes exhibited various forms of *Lasiocampa quercus* from S. Devon (Salcombe), Cornwall (Lizard, St. Ives, Zennor, etc.), Somerset (Dunster), and Sussex (Lewes), and communicated the following notes.

The characters of the Salcombe specimens (14), belonging to 3 different families are as follow: a yellow basal patch is always present and usually pronounced; a wavy rather S-shaped yellow band on forewings which in 12 of the specimens turns sharply outwards at inner margin: the band of the hindwings always turns downwards very noticeably near the anal angle: a large white discal spot on forewing, which is often diamond-shape; the underside yellow band of hindwings is separated from the margin of the wing by a broad band of ground colour.

The Cornish specimens (9) are all somewhat alike and nearly always different from the Salcombe race. Some have the forewing band wavy, others have it comparatively straight, as in the Lewes specimens. The band of the hindwing has a much less pronounced downward turn. The yellow basal patch, although usually present, is considerably smaller, and the white discal spot is not so frequently angulated. Underside similar to the Salcombe specimens.

A specimen from Lewes is included for comparison. This has the forewing band comparatively straight with an inward turn at the inner margin; the hindwing band with no downward turn. The discal spot is round and the basal patch absent. Underneath the band of the hindwing extends quite to the outer margin.

It will be seen the Lewes and Salcombe specimens are very different, and that many characters in the Cornish specimens are intermediate, but distinctly nearer the Salcombe form.

A specimen from Dunster is also included. This is quite unlike the others exhibited and was bred from a larva found on the exposed moor near that town. The bands on all wings are very sharply cut off from the ground colour on the outside (none of the other specimens show this character). In the slope of the bands it follows the Lewes form on the forewings, the Salcombe form on the hindwing, and on the underside. Whether this was the usual form for Dunster area or only an aberration he was unable to say.

Mr. Main exhibited a larva and a cocoon of a Javan ant-lion and noted that the European ant-lions go backwards in making pits, but the Javan species goes forward.

Dr. Cockayne remarked that Dr. Harrison had called attention to the fact that of recent years the larvae of many species of Geometers are becoming melanic, and exhibited three forms of the larva of *Anticlea berberata*, the typical form, a yellowish orange form and a black form.

Lantern slides were exhibited by Mr. R. Adkin and Mr. Bunnett.

NOVEMBER 24th, 1932.

The PRESIDENT in the Chair.

Dr. Norman H. Joy of Reading, Rev. J. H. Marcon of Chingford, Mr. P. N. Crow of Maidenhead, Mr. C. T. South of Caversham and Mr. A. T. O'Farrell of Wimbledon were elected members.

Mr. C. N. Hawkins exhibited a short series of *Cilix glaucata*, Sc.

(*spinula*, Schiff.) to draw attention to a case of extremely rapid emergence of the imago. The exhibit comprised:—*First*, two specimens (one very pale and lightly marked) bred from larvae beaten from Blackthorn at Chiddingfold, Surrey, on July 2nd, 1932. Both larvae pupated within a day or two, although still rather small, and the imagines, ♂ and ♀, emerged on July 16th, 1932, *viz.*, just a fortnight after the larvae were obtained. Both imagines are small. These would probably have produced a 3rd brood in captivity. *Secondly* a ♀ of large size, taken at Canvey Island, Essex, on May 28th, 1932, and *Thirdly*, three specimens, of good average size and well marked, bred from ova laid by the last mentioned ♀ on May 28th and 29th, 1932, which did not emerge indoors until September 7th, 30th, and October 13th respectively. Other pupae from the same batch of ova are probably going over the winter. The Canvey Island specimen therefore produced but a partial 2nd brood (and that apparently with difficulty) although the offspring were reared *ab. ovo* in captivity with a plentiful supply of food.

Mr. J. A. Downes exhibited young larvae of various races of *Lasiocampa quercus*, and communicated the following notes on their varied comparative characteristics.

(1) Preserved larvae from Salcombe (S. Devon) and from a cross Lewes ♂ × Salcombe ♀. In each set were representatives of the 1st, 2nd and 3rd instars.

(2) Living larvae in 3rd instar from Salcombe, The Lizard, Lewes × Salcombe cross, and Fréboul (Finistère), Brittany.

(3) Living larvae in 4th instar from Salcombe, Sandown, Lewes and Fréboul.

Although some of the small differences between these larvae are due to individual variation, I have no doubt that most of the greater and striking differences between the various forms are racial, but I cannot prove this definitely in all cases as often I have only a single brood of larvae from each locality.

The chief variable markings of young larvae of *L. quercus* are—

1. The orange marks.
2. The lateral line and additional pale marks between it and the legs.

3. The white colour around the mid-dorsal line (*i.e.* some of the dorsal parts of the orange marks are replaced by white). This last feature becomes increasingly more prominent in the 1st-3rd instars. In the English larvae at least it decreases in prominence after the

3rd instar. The orange marks similarly often (not always) increase from the 1st-3rd instar.

The Salcombe and Lizard larvae, which are practically identical, differ from the Lewes ones in having the orange marks reduced, and only occurring on 2-4 of the 6 subsegments (according to instar) of each abdominal segment. At Lewes the orange marks occur on 5 of the subsegments. The Fréboul larvae have orange developed on 5 subsegments as at Lewes, but differ from these in having the lateral line and the markings beneath it greatly developed (all the English larvae exhibited agree in having this line much interrupted and poorly marked). With respect to the white dorsal markings the Salcombe larvae have it poorly developed, the Lewes one has it considerably more prominent, and in the Fréboul larvae it is almost the most conspicuous part of the larval marking.

The colour of the head in the various forms, shows very little variation in the first 3 instars.

In any points that the Lewes larva differs from the Salcombe ones, the Lewes \times Salcombe seem to be very variable and intermediate between the two parent forms.

Mr. Ennis exhibited a series of *Colotois (Himera) pennaria* including six σ s taken on October 6th, 1930, on Wimbledon Common about average size, near 2 ins. in expanse. One specimen was unusual in having all four wings covered with black dots giving it a speckled appearance. The other five showed variation in the width of the transverse bands. The last one had a blackish cloud outside the lines. In 1932 he visited the same spot on Wimbledon Common and obtained 2 males; the first unfortunately a damaged specimen, had the transverse lines brown on the left side forewings but pink on the right side, but on the hind wings they are pink on the left as well. Besides these he obtained a dark rather small σ and a pale cream-coloured f . He also exhibited a series of forms of both sexes bred from a batch of ova and forced on last spring. Two females, which emerged very early, on Sept. 3rd, are very pale, almost transparent.

Mr. R. A. R. Priske exhibited a considerable number of the shells of the local snail which has been known from time to time as *Helix acuta*, *Helicella barbara* and *Cochlicella acuta* from the three Sussex localities, Hove, Burpham and Saddlescombe.

Mr. Robert Adkin exhibited three specimens of *Polygona c-album* taken in his garden at Eastbourne, feeding at the flowers of Michaelmas daisies, on September 18th, 1915, October 7th, 1926,

and October 6th, 1932, respectively. He said that he believed that 1915 was the first year for a long period in which this species had been taken in East Sussex, but from that time there were more or less frequent records, and in the present year they appeared to be getting even more numerous than recently; he had knowledge of one or more having been seen or captured at Lewes, Laughton, Hassocks, Eastbourne and Northiam. Since *c-album* commenced its eastward spread some twenty years ago it seems to have managed to establish colonies along its path as far as West Sussex; it has certainly been breeding regularly in the Arundel district—Bognor—Pulborough for the past three or four years, but I can find no evidence that it has established itself further east, and it appears probable that these specimens taken from time to time in East Sussex are mere wanderers from the colonies established further to the west.

He also exhibited a specimen of *Orgyia antiqua* captured at Eastbourne on August 26th last, it was considerably darker in colour than Lewisham specimens shown for comparison.

Mr. K. G. Blair exhibited the triangulin larvae of the Oil-Beetles *Meloë violaceus* and *M. proscarabaeus*, the former from a dandelion flower, the latter reared from the eggs. The larva of *M. violaceus* was first described by Kirby as a bee-louse, *Pediculus mellitae*. Though Linnaeus' bee-louse, *P. apium*, had long before been shown to be the larva of *Meloë proscarabaeus*, reared from the egg by DeGeer, Kirby seems to have been so much impressed by the fact that the creature never seemed to grow up, and also that its mandibles were different from those of any known larva, that he suspected some error in DeGeer's observations and was unwilling to accept its identity with *Meloë*. This identity indeed has remained more or less doubtful ever since, the matter being rendered more complicated by Newport who claimed to have had three species of the genus, *proscarabaeus*, *violaceus* and *cicatricosus* from the egg, and stated that these were all yellow and almost indistinguishable except for the slightly larger size of the last-named. Nobody since seems to have reared *M. violaceus* from the egg, but all have accepted his statement that the young larva was yellow. Though I have several times had *M. violaceus* in captivity I have never succeeded in getting them to oviposit so that I have no positive proof of the identity of the larvae exhibited, but by means of elimination I feel confident that Newport must have been at fault and that these larvae are indeed those of *M. violaceus*. Examples have been sub-

mitted to Dr. A. Cros of Algeria, who independently has arrived at the same conclusion that this larva is indeed that of *M. violaceus* though he suggests that the explanation of the confusion with Newport's statement may be that the newly hatched larva is yellow and only subsequently turns black. This however disregards Newport's statement that the triangulins of both species are of equal size.

Mr. Arnold W. Hughes exhibited a large number of Lepidoptera illustrating his captures during the present season including *Asteroscopus nubeculosa* from Rannoch, *Taeniocampa populeti* from Surrey, *Strymon (Thecla) pruni* from Huntingdon, *Hydrilla palustris* from the Breck district, *Dianthoecia albimacula* from E. Kent, *Sterrhia (Ptychopoda) ochrata*, East Kent, *Hyloicus pinastri* and *Coscinia cribrum* from the Dorset heaths, numerous species from Wicken Fen in August, *Coenotephria berberata* from Suffolk, *Pelosia (Lithosia) muscerda* from Norfolk, one *Aplasta ononaria* at light on the Kent coast, May, 1932, and *Heliopholus hispidus* from Portland.

A discussion took place on the distribution of *P. c-album*, whether it bred east of a Chichester-Oxford line, as only odd examples had hitherto been reported for the latter area. A pupa case had been reported from Byfleet.

DECEMBER 8th, 1932.

The PRESIDENT in the Chair.

Mr. E. J. Bunnett exhibited a pair of *Asilus crabroniformis* from Addington, Surrey.

Mr. Hy. J. Turner exhibited a large collection of S. European *Zygaenidae* just received from a correspondent and which he had not yet gone through. Among the species were the very beautiful *Z. occitanica-albicans* of Spain, *Z. fausta* race *apocrypha* from St. Martin Vésubie, a newly differentiated race, *Z. carniolica* from many localities, a long series of *Z. achilleae* showing races from many localities, *Z. angelicae*, many forms of *Z. ephialtes*, the rare and local *Z. laeta*, *Z. sarpedon*, *Z. punctum*, *Z. scabiosae*, some beautiful *Z. stoehadis*, *Z. carniolica*, and forms of other more frequently occurring species.

Lantern slides were then shown by the following members:—

Dr. Bull showed several slides of Egyptian scenery.

Mr. A. W. Dennis showed slides of many flowering plants *in situ*.

Miss Brook showed coloured slides of crabs and sea-urchins, her studies in N. Ireland during the past autumn.

Mr. Bunnett and Dr. Joy also showed slides.

The last named gave a sketch of entomological work which wanted doing and which he urged the younger members to start upon rather than go over the old lines.

JANUARY 12th, 1933.

The PRESIDENT in the Chair.

Mr. Jacobs exhibited enlarged drawings of imagines of the genus *Lithocolletis* (Micro-lepidoptera) which he had recently made and coloured. $\times 10$.

Mr. S. Wakely exhibited a species of Galleriid (Lep.) which was probably imported with fruit or groceries. It was subsequently ascertained to be *Aphomia gularis*.

Dr. Joy exhibited a number of species of British Lepidoptera taken some quarter of a century ago, including *Apatura iris* of which 5 were taken in one afternoon by the old method of a net mounted on a long pole, *Eugonia polychloros* of which the larvae were so abundant that quite 100 emerged in one day alone. The President noted that in some places in India both *A. iris* and *Kallima inachus* usually flew high, but in afternoons might be observed to settle on low and especially favoured branches. Mr. R. Adkin remarked that at the old resort of *A. iris* at Chattenden, on one occasion, a particular branch, that stood out from the side of an oak, growing near the top of a hill, seemed to have an attraction, four males being captured by an ordinary long handled kite net: he at first thought a female might be resting there but this proved not to be so, the position of the branch alone appeared to be the attraction.

Mr. Niblett exhibited the crown gall on Loganberry root, and communicated the following note:—

“Crown galls have been found upon Plum, Rose, Raspberry, Loganberry, Paris Daisy, and many other plants. The galls are usually formed just under ground on the collar or crown, as it is called by gardeners, hence the name “crown gall.” It is owing to this position they frequently escape observation. They commence growth as minute wart-like bodies; growth is rapid, and the surface of the gall becomes coarsely warted and dark coloured. The galls usually decay at the end of one season’s growth and leave an open wound, which penetrates for some distance into the wood.

The following season, gall growth commences around the edge of the wound formed in the previous season. These galls perish in turn, and the process is repeated each season, resulting in a large deep wound which frequently extends to such a degree that the tree breaks off at the crown.

“The crown gall occurs in N. America, Europe, S. Africa and other parts of the world, and sometimes reaches to a considerable size. A gall found on a wild fig in Florida weighed 96 pounds, and one on a willow in S. Africa measuring 20 inches long, and 4 feet 7 inches in circumference, is recorded. These galls often contain mites, nematodes, yeasts, myxomycetes, and various fungi, but a bacterium, *Bacillus tumefaciens*, has been proved in America, to be the primary cause of the disease. The specimen exhibited was found by Mr. S. N. A. Jacobs at Bromley, Kent.”

Dr. Hewer gave a lecture with lantern illustration on the Finley Process in Photography.

A series of slides illustrating the well-known collecting ground around Digne were shown.

JANUARY 26th, 1933.

ANNUAL MEETING.

Mr. T. H. L. GROSVENOR, F.E.S., PRESIDENT, in the Chair.

The Report of the Treasurer, the Balance Sheet and the Report of the Council for the past year were presented, read and adopted.

The following List of Officers and Council were declared elected for the year 1933-4.

President.—C. G. M. de Worms, M.A., A.I.C., F.C.S., F.E.S. M.B.O.U.

Vice-Presidents.—T. H. L. Grosvenor, F.E.S. and T. R. Eagles.

Hon. Treasurer.—A. E. Tonge, F.E.S.

Hon. Librarian.—E. E. Syms, F.E.S.

Hon. Curator.—S. R. Ashby, F.E.S.

Hon. Secretaries.—S. N. A. Jacobs and Hy. J. Turner, F.E.S., F.R.H.S.

Hon. Lanternist.—J. H. Adkin.

Council.—H. W. Andrews, F.E.S.; K. G. Blair, B.Sc., F.E.S.; G. V. Bull, B.A., M.B.; A. W. Dennis; S. Edwards, F.L.S.,

F.Z.S., F.E.S. ; C. N. Hawkins, F.E.S. ; M. Niblett ; F. Stanley-Smith ; Mrs. M. Stanley Smith ; S. Wakely.

The President then read his address which dealt with some Problems in the Study of the *Zygaenidae*, (page 61) and the new President was introduced and took the chair.

Votes of Thanks to the President, Officers, Council and Auditors for their services during the past year were submitted and passed.

ORDINARY MEETING.

Mr. C. M. G. de WORMS, M.A., A.I.C., F.C.S., F.E.S., M.B.O.U.,
PRESIDENT, in the Chair.

The decease of Mr. F. E. A. Colby of Woking, a member since 1930, was reported.

Mr. C. N. Hawkins exhibited a short series, 4 ♂♂ and 1 ♀, of *Miltochrista (Calligenia) miniata*, Forst., bred from ova received from Mr. C. de Worms on July 14th, 1932, and laid by a ♀ taken by him at Southend. He said "On September 8th last I showed two last stage larvae of this species, together with a number of small larvae, all being of this brood, and gave some account of their feeding habits. I also mentioned that the two large larvae had undergone 6 moults as had the small ones also. It now remains to carry on the story. The two large larvae were preserved, but the small ones continued to feed, moult and grow slowly, but steadily, until the end of October and beginning of November, when they also became full-fed. The small larvae had further moults on or about September 16th and 26th, and October 8th, 19th and 30th, making for them eleven moults in all. These later larvae showed a much more gradual change to adult plumage than did the two early ones, which reached full growth in 6 moults, the change in the latter from the penultimate to the final instar being very abrupt. Some of the late larvae were also preserved when full fed but of the remainder the 1st spun up on November 19th, pupated on November 21st, and the imago emerged on December 13th, 1932, while the last spun up on November 25th, pupated on November 27th, and the imago emerged on December 19th, 1932. The solitary ♀ was the 2nd specimen to emerge. The larvae and pupae were kept in a moderately warm room throughout. Evidently the difference in the number of moults undergone by these larvae has nothing to do with sex, and as all were fed together in a glass-topped metal box it is unlikely,

although not perhaps impossible, that there was any variable factor such as food or environment which could have affected two and not the rest. Of the 10 larvae which reached full growth, 2 did so with 6 moults, while 8 required 11 moults. Two larvae required about 60 days to become full-fed, the others took about twice as long. The facts seem to suggest some hereditary factor governing fast or slow growth in the latter case without a really proportionate prolongation of the effectiveness of the larval skin."

Copy of a Card issued under the auspices of the S.E. Union of Scientific Societies for Recording Observations on Immigrant Insects.

| | | | | |
|--|--------------------------|---|------------------|---------------|
| Year | Date | Locality | Flight direction | |
| Time of day | Wind force and direction | Number seen | No. captured | In collection |
| Sex | Condition | Notes (speed, egg-laying, duration of flight) | | |
| Meteorological condition present and past. (Temperature, sun, cloud, rain, etc.) | | | | |
| Recorder or Observer | | Reference if published | | |
| Species and variety | | Determined by | | |

IMMIGRANT INSECT RECORD.

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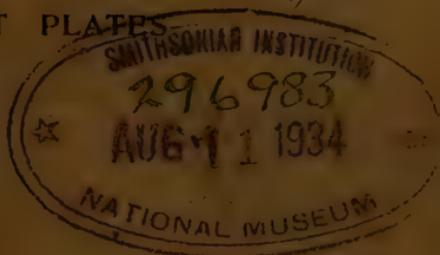
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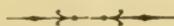
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- 1889 DENNIS, A. W., 56, Romney Buildings, Millbank, S.W.1. *l, mi, b.*
- 1930 DENVIL, H. G., *Council*, 4, Warwick Road, Coulsdon, Surrey. *l, c.*
- 1918 DIXEY, F. A., M.A., M.D., F.R.S., F.R.E.S., Wadham College, Oxford. (*Hon. Member*.)
- 1901 DODS, A. W., 88, Alkham Road, Stamford Hill, N. 16. *l.*
- 1921 DOLTON, H. L., 36, Chester Street, Oxford Road, Reading. *l.*
- 1930 DOWNES, J. A., *Council*, 120, Pepys Road, Wimbledon, S.W.20. *l.*
- 1930 DUDBRIDGE, B. J., 13, Church Lane, Merton Park, S.W. 20.
- 1927 EAGLES, T. R., *President*, 32, Abbey Road, Enfield, Middlesex. *l.*
- 1886 EDWARDS, S., F.L.S., F.Z.S., F.R.E.S., (*Hon. Member*), 20, Spring Grove, Harrogate. *l, el.*

YEAR OF  
ELECTION.

- 1923 ELLIS, H. Willoughby, F.R.E.S., F.Z.S., M.B.O.U., Woodlands, Old Hill, Chislehurst, Kent. *c, orn.*
- 1932 ENNIS, L. H., 16, Ernle Road, Wimbledon, S.W.20. *l.*
- 1920 FARMER, J. B., 156, Loughborough Park, Brixton, S.W.9. *l.*
- 1924 FASSNIDGE, Wm., M.A., F.R.E.S., 47, Tennyson Road, Portswood, Southampton. *l, n, trich, he.*
- 1930 FERRIER, W. J., 86, Portnalls Road, Coulsdon, Surrey. *l.*
- 1887 FLETCHER, W. H. B., M.A., F.R.E.S., Aldwick Manor, Bognor, Sussex. (*Life Member.*) *l.*
- 1926 FLETCHER, P. Bainbrigg, M.B.C., A.I.C., F.R.E.S., *Council*, 65, Compton Road, Wimbledon, S.W.19. *c.*
- 1889 FORD, A., "South View," 42, Irving Road, West Southbourne, Bournemouth, Hants. *l, c.*
- 1920 FORD, L. T., "St. Michael's," Park Hill, Bexley, Kent. *l.*
- 1915 FOSTER, T. B., "Lenore," 1, Morland Avenue, Addiscombe, Croydon. *l.*
- 1907 FOUNTAINE, Miss M. E., F.R.E.S., "The Studio," 100A, Fellows Road, Hampstead, N.W.3. *l.*
- 1921 FRAMPTON, Rev. R. E. E., M.A., Halstead Rectory, Sevenoaks, Kent. *l.*
- 1933 FRASER, Angus, Ranelagh, Gloucester Road, Tankerton, Kent. *c.*
- 1886 FREMLIN, Major H. S., M.R.C.S., L.R.C.P., F.R.E.S., "Heavers," Ryarsh, Kent. *l.*
- 1919 FRISBY, G. E., F.R.E.S., 29, Darnley Road, Gravesend. *hym.*
- 1912 FROHAWK, F. W., M.B.O.U., F.R.E.S., "Essendene," Cavendish Road, Sutton, Surrey. *l, orn.*
- 1928 GILLES, W. S., F.R.E.S., F.I.C., "The Cottage," Bocking, Braintree, Essex. *l.*
- 1930 GILLIATT, F. T., F.R.E.S., 25, Manor Road, Folkestone, Kent. *l.*
- 1929 GLEGG, D. L., F.R.E.S., "Vermala," 9, Westleigh Avenue, Putney, S.W.15. *l.*
- 1920 GOODMAN, A. de B., F.R.E.S., The Old Malt House, Shenley, Church End, nr. Bletchley, Bucks. *l.*
- 1926 GORDON, D. J., B.A., F.R.E.S., Craigellachie House, Strathpeffer, N.B. *col., lep.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend. *l.*
- 1918 GREEN, E. E., F.R.E.S., F.Z.S., "Ways End," Camberley, Surrey. *hem.*
- 1924 GREER, T., J.P., "Milton," Sandholes, Dungannon, Co. Tyrone. *l.*

YEAR OF  
ELECTION.

- 1926 GREY, Olive, Mrs., F.Z.S., 90, Charing Cross Road, W.C.2. *ent.*
- 1932 GRIFFIN, F. J., A.L.A., 41, Queen's Gate, S. Kensington, S.W.7. *ent.*
- 1911 GROSVENOR, T. H. L., F.R.E.S., *Council*, Springvale, Linkfield Lane, Redhill. *l.*
- 1884 HALL, T. W., F.R.E.S., Woodgrange, Shire Lane, Chorley Wood, Herts. *l.*
- 1891 HAMM, A. H., A.L.S., F.R.E.S., 22, Southfields Road, Oxford. *l.*
- 1903 HARE, E. J., F.R.E.S., 4, New Square, Lincoln's Inn, W.C. 2. *l.*
- 1926 HARMSWORTH, SIR H. A. B., F.R.E.S., 4, Kensington Palace Gardens, W.8.
- 1933 HARRIS, CHAS. W., 7, Roseberry Gardens, Dartford. *l.*
- 1924 HARWOOD, P., F.R.E.S., Westminster Bank, 92, Wimborne Road, Winton, Bournemouth. *l.*
- 1927 HAWGOOD, D. A., 2, Kingsmead Road, Tulse Hill, S.W.2. *l.*
- 1924 HAWKINS, C. N., F.R.E.S., *Council*, 23, Wilton Crescent, Wimbledon, S.W.19. *l.*
- 1929 HAWLEY, Lt.-Col. W. G. B., Sibton Church Farm, Yoxford, Suffolk.
- 1913 HAYNES, E. B., 82a, Lexham Gardens, W. 8. *l.*
- 1923 HAYWARD, Capt. K. J., F.R.E.S., F.R.G.S., Florida 414, Buenos Aires, Argentina. *l. orn, c.*
- 1920 HEMMING, Capt. A. F., F.Z.S., F.R.E.S., 18, Glebe Place, Chelsea, S.W. 3. *l.*
- 1924 HENDERSON, J. L., 6, Haydn Avenue, Purley, Surrey. *col.*
- 1931 HERRMANN, E. R., 29, Lebanon Park, Twickenham. *l.*
- 1931 HESLOP, J. R. P., M.A., F.R.E.S., 34, Henleage Gardens, Westbury on Trim, Bristol.
- 1927 HEWER, H. R., M.Sc., D.I.C., Royal College of Science, S. Kensington, S.W. 7.
- 1920 HODGSON, S. B., "St. Philips," Charles Street, Berkhamsted, Herts.
- 1927 HOWARD, J. O. T., M.A., 5, East Sheen Lodge, Sheen Lane, S.W.14.
- 1931 HOWARTH, T. G., 77, Woodland Rise, Muswell Hill, N.10. *l.*
- 1934 HUGGINS, H. C., 875, London Road, Westcliff-on-Sea. *l, ent.*
- 1929 HUGHES, A. W., "Delamere," Buckingham Way, Wallington.
- 1933 HUTCHINGS, H. R., 7, Garden Avenue, Mitcham, Surrey. *l.*
- 1928 JACKSON, F. W. J., "The Pines," Ashtead, Surrey.
- 1914 JACKSON, W. H., "Pengama," 14, Woodcote Valley Road, Purley. *l.*

YEAR OF  
ELECTION.

- 1923 JACOBS, S. N. A., *Hon. Secretary*, Ditchling, 54, Hayes Lane, Bromley. *l, e, ent.*
- 1924 JAMES, A. R., 14, Golden Lane, E.C.1. *l.*
- 1924 JAMES, R., F.R.E.S., 14, Golden Lane, E.C.1.
- 1927 JANSON, O. J., F.R.E.S., *Recorder*, 13, Fairfax Road, Hornsey, N.8. *ent.*
- 1925 JARVIS, C., 12, Claylands Road, Clapham, S.W.8. *c.*
- 1923 JOHNSTONE, J. F., F.R.E.S., "Courtlands," Clarence Parade, Southsea. *l.*
- 1933 JONES, H. G. C., 33, Berrylands, Surbiton, Surrey. *l.*
- 1932 JOY, NORMAN H., M.R.C.S., L.R.C.P., F.R.E.S., M.B.O.U., 271, Kilburn Lane, W.10.
- 1928 KETTLEWELL, H. B. D., Miller Hospital, Greenwich, S.E.10. *l.*
- 1933 KEYWOOD, K. P., Croft Cottage, Hare Lane, Claygate, Surrey. *ent, o.*
- 1910 KIDNER, A. R., "The Oaks," Station Road, Sidcup, Kent. *l.*
- 1925 KIMMINS, D. E., 16, Montrave Road, Penge, S.E. 20. *l.*
- 1933 KING, H., D.SC., F.R.S., "Amanita," 28, Hawthorne Avenue, Northwick Park, Harrow. *l, orn.*
- 1925 LABOUCHERE, Lt.-Col. F. A., F.R.E.S., 15, Draycott Avenue, S.W.3.
- 1924 LANGHAM, Sir Chas., Bart., F.R.E.S., Tempo Manor, Co. Fermanagh. *l.*
- 1927 LAWSON, H. B., F.R.E.S., The Links, Worplesdon Hill, near Woking. *l.*
- 1922 LEECHMAN, C. B., "Pansala," Roundabouts, Storrington, Sussex. *l.*
- 1914 LEEDS, H. A., Wood Walton, near Sawtrey, Peterborough. *l.*
- 1919 LEMAN, G. C., F.R.E.S., "Wynyard," 52, West Hill, Putney Heath, S.W. 15. *c.*
- 1933 LIPSCOMB, C. G., Lieut., Somerset Light Infantry, Blackdown, Surrey. *l.*
- 1932 LOUTH, C. S., "Silver Hill," Grosvenor Road, Caversham.
- 1932 LOW, A. M., 6, Manor Gardens, Gunnersbury Pk., Acton.
- 1926 MACDONALD, F. W., 82, Trinity Street, Leytonstone, E.11. *l.*
- 1931 MACNULTY, B. J., "Rutland," 67, All Saints Road, Sutton.
- 1892 MAIN, H., B.SC., F.R.E.S., F.Z.S., Woodside Road, Woodford Green, Essex. *l, nat. phot., col.*
- 1889 MANSBRIDGE, W., F.R.E.S., "Monreith," Derby Road, Formby, Liverpool. *l, c., etc.*
- 1932 MARCON, Rev. J. W., 105, Endlebury Road, Chingford, E.4.

YEAR OF  
ELECTION.

- 1930 MARSH, D. G., "Delville," Oxenden Square, Herne Bay. *l.*
- 1922 MASSEE, A. M., F.R.E.S., East Malling Research Station, Kent. *l.*
- 1932 MELLOWS, W. T., M.B.E., LL.B., Scatton, Thorpe Road, Peterborough.
- 1889 MOORE, H., F.R.E.S., 12, Lower Road, Rotherhithe, S.E.16.  
*l, h, d, e l, e h, e d, mi.*
- 1930 MORLEY, A. McD., 9, Radnor Park West, Folkestone.
- 1920 MORISON, G. D., B.SC., PH.D., F.R.E.S., Dept. Advisory Entomology, N. of Scotland Agricultural College, Marichall, Aberdeen. *ec. ent.*
- 1923 NASH, T. A. M., B.SC., PH.D., D.SC., F.R.E.S., Tsetse Investigation, Gadau, via Joss, N. Nigeria. *l.*
- 1923 NASH, W. G., F.R.C.S., "Clavering House," de Pary's Avenue, Bedford. *l.*
- 1906 NEWMAN, L. W., F.R.E.S., Salisbury Road, Bexley, Kent. *l.*
- 1926 NEWMAN, L. H., Salisbury Road, Bexley, Kent. *l.*
- 1930 NIBLETT, M., *Council*, 10, Greenway, Wallington, Surrey. *galls.*
- 1931 NICHOLSON, D. A., 11, Birkbeck Road, Dulwich, S.E.21.
- 1926 NIXON, G. E., B.A., 315B, Norwood Road, Herne Hill, S.E.24. *h, l.*
- 1932 O'FARRELL, A. F., 20, Crescent Road, Wimbledon, S.W.19.
- 1911 PAGE, H. E., F.R.E.S., 9, Vanbrugh Hill, Blackheath, S.E.3. *l.*
- 1927 PALMER, D. S., "North Lodge," Esher.
- 1930 PEARMAN, Capt. A., Elm Cottage, Purley, Surrey. *l.*
- 1908 PENNINGTON, F., Oxford Mansions, Oxford Circus, W.1. *l.*
- 1928 PERKINS, J. F., F.R.E.S., 19, Courtfield Gardens, S.W.5. *h.*
- 1933 PEYTON, A. G., Holly Bank, Napleton Road, Ramsgate. *l.*
- 1933 PINHEY, E. C. S., 36, Wetherby Mansions, Earl's Court Square, S.W.5. *ent.*
- 1933 PINNIGER, E. B., 19, Endlebury Road, Chingford, E.4. *p, l.*
- 1933 POOLES, S. W. P., "Richmond," Alderman's Drive, Peterborough. *l.*
- 1925 PORTSMOUTH, J.
- 1925 PORTSMOUTH, G. B.
- 1912 POULTON, PROF. E. B., D.SC., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., F.R.E.S., "Wykeham House," Oxford. (*Hon. Member.*)
- 1927 PRATT, W. B., 10, Lion Gate Gardens, Richmond Lane.
- 1897 PREST, E. E. B., 8 and 9, Chiswell Street, E.C.1. *l.*
- 1924 PRIEST, C. G., 67, Portland Road, Holland Park, W.11. *l.*
- 1904 PRISKE, R. A. R., F.R.E.S., 136, Coldershaw Road, W. Ealing, W. 5. *l, m.*

YEAR OF  
ELECTION.

- 1922 RAIT-SMITH, W., F.Z.S., F.R.E.S., F.R.H.S., "Hurstleigh,"  
Linkfield Lane, Redhill, Surrey. *l*.
- 1925 RALFS, Miss E. M., F.R.E.S., 27, Shaftesbury Road, Ravens-  
court Park, W.6.
- 1922 RATRAY, Col. R. H., Halliford House, Newton Abbot, Devon.  
*l*.
- 1887 RICE, D. J., 8, Grove Mansions, North Side, Clapham  
Common, S.W. 4. *orn*.
- 1920 RICHARDSON, A. W., F.R.E.S., 28, Avenue Road, Southall,  
Middlesex. *l*.
- 1908 RILEY, Capt. N. D., F.R.E.S., F.Z.S., 7, McKay Road, Wimbledon,  
S.W.20. *l*.
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pul-  
borough, Sussex. *l*.
- 1911 ROBINSON, Lady MAUD, F.R.E.S., Kirklington Hall, Newark.  
*l, n*.
- 1920 ROTHSCHILD, THE RIGHT HON. LORD, D.SC., F.R.S., F.I.S., F.Z.S.,  
F.R.E.S., Tring, Herts. *l, orn*. (*Life Member*.)
- 1887 ROUTLEDGE, G. B., F.R.E.S., "Tarn Lodge," Heads Nook,  
Carlisle. *l, c*.
- 1890 ROWNTREE, J. H., "Scalby Nabs," Scarborough, Yorks. *l*.
- 1932 RUDLAND, W. L., 211, Caversham Road, Reading.
- 1932 RUSSELL, A. G. B., M.V.O., F.R.E.S., Scarbank House, Swanage,  
Dorset. *l*.
- 1915 RUSSELL, S. G. Castle, Homestead, Crawley, Winchester,  
Hants. *l*.
- 1908 ST. AUBYN, Capt. J. A., F.R.E.S., 14, Purley Knoll, Purley.
- 1910 SCORER, A. G., "Hillcrest," Chilworth, Guildford. *l*.
- 1927 SCOTT, E., M.B., "Hayesbank," Ashford, Kent. *l*.
- 1923 SEVASTOPULO, D. G., F.R.E.S., (*Life Member*), c/o Ralli Bros.  
Ltd., Calcutta. *l*.
- 1933 SHARMAN, F. W., 183, Star Road, Peterborough. *l*.
- 1910 SHELDON, W. G., F.Z.S., F.R.E.S., "West Watch," Oxted,  
Surrey. *l*.
- 1898 SICH, ALF., F.R.E.S., Coburg Court Hotel, Bayswater Road,  
W.2. *l*.
- 1925 SIMMONS, A., 42, Loughboro Road, W. Bridgford, Nottingham. *l*.
- 1921 SMART, Major, H. D., R.A.M.C., M.D., D.SC., F.R.E.S., 172, High  
Road, Salway Hill, Woodford Green. *l*.
- 1908 SPERRING, C. W., 8, Eastcombe Avenue, Charlton, S.E. 7. *l*.

YEAR OF  
ELECTION.

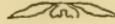
- 1927 STANLEY-SMITH, F. S., F.R.E.S., "Oaklands," Brampton, Huntingdon. *l*.
- 1928 STANLEY-SMITH, Mrs. Maud, "Oaklands," Brampton, Huntingdon. *l*.
- 1928 STOCKEN, H. E. W., Orchard Cottage, W. Byfleet, Surrey.
- 1924 STOREY, W. H., "Tendera," Stinchcombe Hill, Dursley, Glos. *ent*.
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 42, Chalkwell Avenue, Westcliff-on-Sea, Essex.
- 1929 STUBBS, G. C., Survey Dept., Kuala Lumpur, F.M.S.
- 1916 SYMS, E. E., F.R.E.S., *Vice-President*, *Hon. Librarian*, 22, Woodlands Avenue, Wanstead, E.11. *l*.
- 1922 TAMS, W. H. T., F.R.E.S., 5, Daisy Lane, Hurlingham, S.W. 6. *l*.
- 1894 TARBAT, Rev. J. E., M.A., 1, Romsey Road, Winchester. *l*, *ool*.
- 1913 TACHELL, L., F.R.E.S., Swanage, Dorset. *l*.
- 1934 TAYLOR, J. O., Lyndhurst, Grosvenor Road, Orpington. *l*.
- 1925 TAYLOR, J. S., M.A., F.R.E.S., P.O. Box 513, Pretoria, Union of S.A. *l*.
- 1929 TETLEY, J., "White Cottage," Silverlea Gardens, Horley.
- 1931 THOMPSON, J. A., Tan-y-Bryn School, St. Margarets Drive, Llandudno, N. Wales. *l*.
- 1933 THORPE, R. A., "Homestead," Forest Hill Road, Honor Oak, S.E.23.
- 1926 TOMLINSON, Miss Florence B., "The Anchorage," 51, Lodge Road, West Croydon. *l*.
- 1902 TONGE, A. E., F.R.E.S., *Hon. Treasurer*, "Aincroft," Grammar School Hill, Reigate. *l*.
- 1887 TURNER, H. J., F.R.E.S., F.R.H.S., *Hon. Editor*, "Latemar," 25, West Drive, Cheam, Surrey. *l, c, n, he, b*.
- 1932 TURPIN, S. J., 1, Windcliffe Mansions, Letchmere Road, Willesden Green, N.W.2.
- 1889 WAINWRIGHT, C. J., F.R.E.S., 172, Hamstead Road, Handsworth, Birmingham. *l, d*.
- 1929 WAINWRIGHT, J. Chas., 9, Priory Road. Hook Road, Surbiton, Surrey.
- 1911 WAKELY, L. D., 15 Berkeley Place, Wimbledon, S.W.19. *l*.
- 1930 WAKELY, S., *Council*, 46, Peak Hill, Sydenham, S.E.26. *l*.
- 1880 WALKER, Comm. J. J., M.A., F.L.S., F.R.E.S., "Aorangi," Lonsdale Road, Summertown, Oxford. *l, c*.

YEAR OF  
ELECTION.

- 1927 WALKER, W. H., "Ranworth," Potters Bar. *l*.
- 1933 WALTER, F. G., 131, Prince's Avenue, Palmer's Green, N.13.
- 1925 WARD, J. DAVIS, F.R.E.S., "Limehurst," Grange-over-Sands. *l*.
- 1920 WATSON, D., "Proctors," Southfleet, Kent. *l*.
- 1928 WATTS, W. J., 42, Bramerton Road, Beckenham. *c*.
- 1928 WELLS, Clifford, "Dial House," Crowthorne, Berks. *l*.
- 1911 WELLS, H. O., York Gate, Cheam Road, Ewell. *l*.
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.R.E.S., "Ellesmere,"  
Gratwicke Road, Worthing. *l*.
- 1927 WHITE, A. G., "Hilltop," Chaldon, Surrey.
- 1930 WILKINS, C.
- 1914 WILLIAMS, B. S., "St. Genny's," 15, Kingcroft Road, Harpenden. *l, c, hem*.
- 1925 WILLIAMS, H. B., LL.D., F.R.E.S., "Red Mayes," 79, Broad Lane, Hampton-on-Thames, Middlesex. *l*.
- 1932 WILLIAMS, S. W. C., 4, Nelson Road, S. Chingford, E.4.
- 1932 WINDHAM, W. S., 40, Wellesley Road., Chiswick, W.4.
- 1927 WITTING, A. N., 6, Woolstone Road, Catford, S.E. 6.
- 1918 WOOD, H., "Albert Villa," Kennington, near Ashford, Kent. *l*.
- 1926 WOOTTON, W. J., F.R.H.S., Wannock Gardens, Polegate, Sussex.  
*l*.
- 1927 DE WORMS, C. G. M., M.A., F.R.E.S., M.B.O.U., F.C.S., F.I.C., *Vice-President*, Milton Pk., Egham, Surrey. *l, orn*.
- 1921 WORSLEY-WOOD, H., F.R.E.S., 37, De Freville Avenue, Cambridge. *l*.

Members will greatly oblige by informing the Hon. Sec. of any errors in, additions to, or alterations required in the above Addresses and descriptions.

## REPORT OF THE COUNCIL FOR 1933.



The magnificent weather experienced during the past season makes it one upon which naturalists might well look back as productive of much interesting material for discussion during the winter period, and if stimulation were necessary, it would certainly have stimulated the activities of the Society. Immigrant insects, both common and rare have appeared in interesting numbers, and native species have been plentiful, many showing more broods than is usual in this country. The Council may certainly look back on this season as one during which the forward movement of the Society has been well maintained.

The membership consists of 226 full members, 32 country members, 5 life members, and 4 honorary members, making a grand total of 258; there have been 16 elections and 13 resignations.

The Treasurer, notwithstanding the fact that he has been indisposed for the greater part of the season, has carried on his financial duties, and has produced his usually healthy and cheering Balance Sheet, duly audited by Messrs H. W. Andrews and E. J. Bunnett.

There have been the usual twenty-two meetings (exclusive of the Annual Exhibition) at the Society's Rooms at which the average attendance was 37·5, and papers were read by Mr. E. E. Syms, Mr. E. J. Bunnett, Mr. K. G. Blair, Mr. M. Niblett, Dr. E. A. Cockayne, Dr. N. H. Joy, and Mr. D. E. Kimmins, and the Lantern, manipulated by Mr. J. H. Adkin, has been in use on eight occasions.

There were ten Field Meetings; Effingham, Oxshott, Chilworth, Brentwood, Broadwater Forest, Forest Row, Benfleet and Thames Marshes, Byfleet, Eynsford, and Westerham, led by Messrs Eagles, Hawkins, de Worms, Bull, Jacobs, Wakely and Blair, and all of which, with the possible exception of the last (which was held at

the height of the drought) were productive of interesting material in many orders.

The thanks of the society are due to those members whose work in the presentation of papers, and the organisation of Field Meetings have added to the enjoyment and success of the season.

The Council regret to note that many exhibits have not been suitably described in written notes handed to the Editor for publication in the proceedings. It is gratifying to note, on the other hand, that the Field Meetings have been well reported by the several leaders, all of which reports add materially to the value of the annual volume when published. This reporting of captures, observations, exhibits, and meetings is a practice which has still room to grow, however, and there must be no resting on laurels.

The Annual Exhibition took place on the 26th October and may be said to have been an unqualified success, as might be expected after such a perfect summer. There were many interesting local collections of insects, chiefly taken at the Field Meetings, some species new to the British List, and some interesting queries. Over and above these, there was a very fine selection of beautiful water colour drawings of insects and of botanical subjects. The number of members and others exhibiting was over fifty, which is a number unsurpassed for many years, and speaks well for the general character of the exhibition, which was by no means confined to a few well known exhibitors. The total attendance was 234.

The thanks of the Society are due in this connection to Messrs. Grosvenor and Goodman for their work in organising the exhibition and arranging the catering side respectively, the proper functioning of both of which offices contributed in no small degree to the general success of the evening.

Messrs. C. G. M. de Worms and T. R. Eagles went as Delegates from the Society to the Centenary Celebrations of the Royal Entomological Society of London, and as such presented an Illuminated Address.

Messrs. Robert Adkin and Henry J. Turner, as before, represented the Society at the Annual Congress of the South-Eastern Union of Scientific Societies, and Mr. Adkin attended the Conference of Corresponding Societies, as the Society's delegate, at the meeting of the British Association. The reports are printed in these Proceedings.

The Volume of Proceedings and Transactions of the Society consists of 137+xx pp. with nine plates, and this volume has been

very well reviewed in the Entomological Magazines as being in keeping with the progressive spirit of the Society. The very sincere thanks of the Society are due to those gentlemen, whose generosity has made possible the publication of the plates, which add so much to the value of the volume.

The gift by Dr. N. H. Joy of his Collection of Coleoptera, arranged according to the classification in his recent book, together with the cabinet in which it is contained, is a much appreciated addition to the Society's existing collections and the Society desires to put on record its sincere thanks for so valuable a gift.

The Curator reports that, apart from the above, donations to the collections have not been so numerous as usual, they are, however, above the normal in value as Scientific Material, and include the following:—

Dr. E. A. Cockayne and Mr. C. N. Hawkins: Preserved skins of several larvae of British Lepidoptera.

Mr. H. W. Andrews: British Diptera.

Mr. E. E. Green: Numerous Tineina from Camberley district.

Mr. S. N. A. Jacobs: A pair of the Galleriid moth *Aphomia gularis*, a recent introduction to the List of British Lepidoptera (1917).

Mr. H. St. J. Donisthorpe: Twenty-one species of rare Coleoptera from Windsor Forest.

Also numerous specimens of British Tineina, from the Trustees of the British Museum (Natural History).

For all of these the Society returns its best thanks.

The Librarian Reports that "During the year the library has been increased by the binding up of Journals, the gift and purchase of books. The number of books issued for home study was 252, an increase on last year.

Books.—British Lepidoptera, Revised. Meyrick (W. Rait Smith); Diptera of Patagonia, 2 pts. (Brit. Mus.); British Salt Water Fish; Hist. of the Ent. Soc. of Lond. (H. J. Turner); Butt. and Moths of N. Zealand, Hudson (L. Taubman); Biology of the Philippine Islands; Argentine *Hesperiidæ*, 3 parts, Hayward (the author); *Empidæ* of Patagonia and Chili (B.M.); British Ants, Revised, H. Donisthorpe (purchased).

PROCEEDINGS, TRANSACTIONS, REPORTS, ETC.—Proceed. I. of. Wight N. H. Soc.; S. E. Naturalist and Antiquary; Bull. and Ann. Soc.

ent. de France; Ann. Report of the Smithsonian Institute; Ann. Rep. of the Conference of Delegates to the Brit. Association (Mr. Adkin); Bull. R. Scuola d'Agri. Portici; Report of the U.S. National Mus.; Jr. Commons and Footpaths Preservation Soc.; London Nat.; Trans. and Proceed. of the S. of Eng. Ent. Soc.; Proc. Croydon N. H. Soc.; Rep. of the Hastings and E. Sussex N. H. Soc.; Rep. of the Perthshire Science Soc.; Proceedings of the Bournemouth N. Science Soc.; Trans. Leicester Science Soc.; Trans. Wisconsin Acad. of Science; Proc. Russ. N. H. Soc. Leningrad 1-4; Zool. Bidraga, Upsala; Trans. Connecticut Acad.; Rep. of the Field Mus. of Chicago; Trans. Carlisle N. H. S.

PERIODICALS, MAGAZINES :—Entomologist; Ent. Mo. Mag. (purchased); Ent. Record and Jr. of Variation; Canadian Ent.; Ent. News; Repertorium; Natural History; Vasculum; Revue Russe d'Ent.; Revista Ent. Soc. Argentina; Essex Nat.; Folia Zoologica Riga.

SEPARATA :—American Smithsonian Institute; Variation in *P. philete* (K. J. Hayward); Colorado College Publications; Argentine National Mus. N.H.; Royal Academy; Lloyd Library; Mosely on *Leptolema*, Trichoptera (B.M.); Commons and Footpaths Soc. 7 pamphlets; and from Messrs. R. Adkin, M. Niblett, Hawkins, etc.

The thanks of the Society are accorded to the donors.

## HON. TREASURER'S REPORT, 1933.

The figures for the past year show quite a healthy state of affairs if nothing of an outstanding nature, and as I have been so unfortunate as to spend a large part of the year in the doctor's hands, and in consequence have been absent from my usual place at the "Receipt of custom" at our meetings, it is with all the more satisfaction that I am able to report a very marked increase in the subscriptions paid, both for the current year, and for unpaid arrears. The former show an advance of £26 and the latter amount to £39 against my estimate last year of £25.

As compared with last year our general expenses have been much about the same with a slight increase of £3 in the cost of administration and catering for the Annual Exhibition. The total amounting to £89 8s. 5d. The publication of our "Proceedings" has again been a costly business, and at £109 12s. 3d. is about £7 higher than last time, but I think the press reviews show that our efforts have been appreciated by the entomological fraternity.

We have added to our library by purchase a copy of Butler's "Hemiptera." On the other side of the ledger we find that our income has been well maintained, and as already stated subscriptions have come in more freely. Interest on investments is rather less, owing to the conversion of our holding in 5% War loan to 3½% War stock, and entrance fees are down slightly. Donations to the various funds have been very well supported, one consistently generous member having given us all but two of the half tone blocks for the "Proceedings," and another member gave these, while two others contributed £3 3s. 0d. to the cost of the illuminated Address which we presented to the Royal Entomological Society of London on the occasion of their Centenary Celebrations. The Refreshment Fund brought in £18 1s. 6d. a record figure, which covers the cost of catering all but £1 3s. 6d. Other items of interest are the sale of the Tugwell Herbarium, and the receipt of a Life membership fee, also the final instalment of the late Major Liles' legacy, amounting to £1 18s. 3d.

[continued on p. xx.



## SUSPENSE ACCOUNT.

|                                 |         |         |
|---------------------------------|---------|---------|
| To Balance carried down .. .. . | £ s. d. | 3 9 0   |
|                                 |         | 15 7 9  |
|                                 |         |         |
|                                 |         | £15 7 9 |
|                                 |         |         |
|                                 |         | £15 7 9 |

By balance brought forward from 1932 .. .. .  
 " Legacy from the late Major C. E. Liles less tax .. .. .  
 " Life Membership Fee .. .. .  
 " Entrance fees .. .. .

## PUBLICATION FUND.

|                                 |         |           |
|---------------------------------|---------|-----------|
| To Printing Proceedings .. .. . | £ s. d. | 2 7 7     |
| " Reprints .. .. .              |         | 2 4 6     |
| " Half-tone Blocks .. .. .      |         | 20 11 5   |
|                                 |         |           |
|                                 |         | 109 12 3  |
| " Postages .. .. .              |         | 3 9 2     |
| " Envelopes .. .. .             |         | 3 4       |
|                                 |         |           |
|                                 |         | 3 12 6    |
| " Balance carried down .. .. .  |         | 12 0      |
|                                 |         |           |
|                                 |         | £113 16 9 |

By Balance brought from 1932 .. .. .  
 " Donations .. .. .  
 " " ½ tone blocks .. .. .  
 " Interest on 3½% War Loan (Chapman bequest) .. .. .  
 " Sales of Proceedings .. .. .  
 " Grant from General Fund .. .. .

## BALANCE SHEET.

|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><i>Liabilities.</i></p> <p>To Balance, being excess of assets over liabilities .. 974 7 4</p> | <p><i>Assets.</i></p> <p>By Balances—</p> <p>Revenue a/c .. .. . 65 10 2<br/>             Publication Fund .. .. . 12 0<br/>             Library Fund .. .. . 17 1<br/>             Suspense a/c .. .. . 15 7 9</p> <p>Investments at current quotations .. .. . 82 7 0</p> <p>£300 3½% War Stock at 101½ .. .. . 305 1 3<br/>             £391 15 3 ¾% Con. Loan at 102½ .. .. . 400 16 2<br/>             £154 14s. 4% Consols at 110½ .. .. . 171 2 11</p> <p>Subscriptions unpaid:—<br/>             Good 15 0 0<br/>             Doubtful 25 0 0</p> <p style="text-align: right;">877 0 4</p> |
|                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                  | £974 7 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Examined and found correct, this 20th January, 1934.

H. W. ANDREWS, }  
 E. J. BUNNETT } *Auditors.*

As compared with last year the final figures in the Balance Sheet show an increased excess of assets over liabilities amounting to £43 13s. 9d. taking the value of overdue subscriptions outstanding at the very conservative figure of £15. Of this sum £30 is accounted for by the increased value of our investments which I have again set down at current market prices.

Altogether our assets stand at the very substantial figure of £974 7s. 4d. which I feel sure you will consider satisfactory.

The accounts and balance sheet have been audited and found correct by Messrs. H. W. Andrews and E. J. Bunnett to whom I wish to tender my thanks and also to all those members who have contributed to the Publication, Refreshment, and Address funds.

The details of the accounts and balance sheet are appended.

## ABSTRACT OF PROCEEDINGS.

9th FEBRUARY, 1933.

MR. C. G. M. DE WORMS, PRESIDENT, in the Chair.

Mr. Robert Adkin exhibited a series of the Tortrix *Polychrosis* (*Sericoris*) *littoralis*, Westw. (Curt.). He said that this species had been recorded from only three localities in Sussex (Clymping Common; Hastings and Pett) until three specimens came to light in his garden at Eastbourne during the latter part of August, 1930, and in 1932 five further specimens were taken in the same way. The larvae are said to feed in the shoots and flowerheads, and on the leaves of the common thrift (*Armeria*), of which plant there are several clumps in the garden, all of local origin, but although he had often searched them he had been unable, so far, to find the larva. He thought, however, that the species must be breeding either in them or in some of the larger clumps of the thrift growing on the coast, less than a quarter of a mile from his garden.

He also shewed a series of *Argyroploce* (*Orthotaelia*) *striana*, Schiff., a common species that feeds in the roots of the dandelion (*Taraxacum*). He said that although he had worked the immediate neighbourhood pretty closely for many years he had not met with the species until it came to light in his garden fairly frequently during the last two or three seasons.

Mr. A. F. O'Farrell exhibited a long series of *Hybernia defoliaria* and communicated the following note.—

“ During November and early December of last year, *Hybernia defoliaria*, Cl. was extremely plentiful, and, by searching after dusk with a torch on Wimbledon Common, a series of thirty males, showing most of the usual aberrations of the species, was obtained.

“ In the exhibit the males were arranged in seven groups:—

- (1) Yellowish or light brownish bands on a creamy ground.
- (2) Dark brown or black bands on whitish ground. (*ab. obscura*, Dhlstr.)
- (3) Dark brown or black bands on light brown ground (*ab. progressiva*, Haverk.).

(4) As (3) but inner band more or less absent, outer band less definite.

(5) As above, but more speckled with black, bands absent, but cross lines strong.

(6) Lines, and in most cases discal dot, absent: colour uniform reddish brown or dark reddish brown, veins more or less distinctly red orange. Speckled with black.

(7) Plainer than above (less black speckling) colour reddish-grey or almost black, veins in red (ab. *obscurata*, Stgr.).

“The four females show most of the variation possible in such almost completely apterous insects: namely, in size, position and confluence or otherwise, of the dorsal spots, and in ground colour. One is decidedly larger than the others, and there seems to be some variation in the sizes of the wing-flaps in proportion to that of the body.”

Mr. S. Wakely exhibited the Lepidopteron *Aphomia gularis*, Zell. and read the following note on its occurrence in this country.

“Since taking this moth in Finsbury last July, another living specimen was brought to me a few days before Christmas, which a friend had taken flying indoors at Upper Norwood. This was much smaller than the previous specimen, and so different in colour and marking, that I was doubtful of it being the same species. On taking it to the British Museum, Mr. West at once pronounced it a specimen of *Aphomia gularis*. Still another specimen had been sent to him for identification some weeks previously, taken in the New Forest district. Apparently this species is spreading, and as little seems to be generally known at present of this species in England, the following particulars may be of interest.

“The species was recorded as first noticed in America in 1921. The larvae were found in numbers in sacks of shelled peanuts, which had arrived in California from China.

“The following year (1922) there is a note in the “Ent. Mo. Mag.” (LVIII. p. 191) of its occurrence in England, a cargo of walnuts from Marseilles being found infested with the larvae. It was observed that the larvae bored holes in the wood of the packing cases and formed a cocoon therein for pupation. No doubt the specimens in the Museum came from this source.

“A further record of the species appears in the “Ent. Mo. Mag.” (LXVII. 1931, pp. 59-60). This time the larvae were feeding on Algerian almonds, reported from the London docks.

“The original home of this species is apparently China and Japan.

"I am indebted to Mr. West for naming this species, and for suggesting that I might find further particulars of it in the volumes of the "Review of Applied Entomology" at the Museum, from whence these particulars were gleaned."

Mr. C. N. Hawkins exhibited a very fine series of *H. defoliaria*, Cl., from Chingford to show the melanism, which is exhibited in this species at the present time.

Mr. E. E. Syms gave an account of the British species of Mecoptera and illustrated his notes with numerous lantern slides. (See "Trans.")

23rd FEBRUARY, 1933.

The PRESIDENT in the Chair.

Dr. H. King, D.Sc., of Harrow was elected a member.

Dr. Williams exhibited a long series of *Spilosoma menthastris*, Esp., bred from Edinburgh parents and pointed out their characteristic colour, a deeper cream than in those of more southern origin.

Mr. E. J. Bunnett read a paper "The Fungus Family," and exhibited a large number of lantern slides in illustration.

9th MARCH, 1933.

MR. T. R. EAGLES, VICE-PRESIDENT, in the Chair.

Mr. R. A. Thorpe, of Sydenham Hill was elected a member.

Dr. K. G. Blair exhibited specimens of an uncommon Sciomyzid fly *Lucina fasciata*, Mg. reared from a series of the Sandhill Snail, *Helix pisana*, Muller, collected on the sandhills near Tenby in September last. The flies probably emerged soon after that date, as they were found dead in the box in February.

Dr. E. A. Cockayne exhibited a series of imagines of *Eupithecia arceuthata*, Freyer, and of *E. helveticaria*, Boisds., for comparison. He said that the former species was rare and local in this country and confined to the N. Downs and the Chilterns, the larvae feeding on *Juniperus communis*. It was common on the continent. The latter was common in Scotland, the larvae feeding there on *Juniperus nana*. On the continent it was confined to Switzerland.

On behalf of Mr. Siviter Smith of Pebworth nr. Stratford-on-Avon, Mr. Hy. J. Turner exhibited an aberration of *Plusia moneta*, Fb., which had been named *esmeralda* by M. Oberthür, in which "the ground colour is shining whitish with the brown suffusion and markings much reduced." The specimen agrees almost exactly with the figure in Seitz "Pal. Noctuae," III. pl. 65, i. The form had not hitherto been recorded from Britain.

Mr. Thorpe exhibited living larvae of the common stag-beetle, *Lucanus cervus*, L., found under a wooden step in his garden.

Mr. Bedford exhibited lantern slides of Lepidopterous larvae and imagines and numerous slides in colour of wild flowers *in situ*.

Mr. Dennis exhibited lantern slides of the catkins of various trees and bushes generally met with in this country.

23rd MARCH, 1933.

The PRESIDENT in the Chair.

Mr. de Worms exhibited living young larvae of *Aporophyla nigra*, Haw., bred from the ova of a female captured on the southern borders of Berkshire.

Mr. Ennis exhibited a short series of *Phigalia pedaria*, Fab. (*pilosaria*, Hb.), to show the melanic tendency of this insect in the Wimbledon district, including 3 ab. *monacharia*, Stgr. (2 in 1932 and 1 in 1933), 2 intermediate between this and the typical form.

From the information of various members it was noted that most of the early spring insects had put in an appearance, even *Lycænopis argiolus*, L., and sallows were out in some districts.

Dr. K. G. Blair exhibited a case of preserved larvae of Coleoptera of the different Families represented in Britain and read a paper "The Larvae of the Coleoptera" (see "Trans."). A short Discussion took place.

5th APRIL, 1933.

FIELD MEETING—EFFINGHAM.

Leader.—MR. T. R. EAGLES.

Eleven members attended. The afternoon was warm and sunny. Following the spell of fine weather the vegetation was forward and the ground dry for the time of year.

It was decided to walk towards Ockham and to work in the pine and heather country until tea-time.

The following larvae were obtained:—*Ellopia fasciaria*, L., (*prosapiaria*, L.); *Thera obeliscata*, Hb.; *Perconia strigillaria*, Hb.; *Boarmia repandata*, L., and *Laspeyria (Arentia) flexula*, Schiff.; and the following imagines:—*Pachynemina hippocastanaria*, Hb.; *Xylocampa areola*, Esp., and *Boarmia crepuscularia*, Hb.

Members who had chosen different routes encountered *Polygonia c-album*, L.

Many species of coleoptera were taken; the pine trees yielded the handsome ladybird *Anatis ocellata*, L. also *Aphidecta obliterated*, L. The members sweeping the ling for lepidopterous larvae obtained, as would be expected, the common ling-feeding beetles, *Lochmaea suturalis*, Th. and *Strophosomus lateralis*, Pk. One of the pine trees was observed to be badly infested by a boring beetle probably *Myelophilus piniperda*, L. each hole being marked by a ring of dried resin. Efforts to obtain one of the beetles were fruitless, but the ant beetle, *Thanasimus formicarius*, L. which preys on these boring beetles, was observed on the tree. An opportunity was found to collect carrion beetles. *Oceoptoma thoracica*, L., *Thanatophilus rugosus*, L. and *T. sinuatus*, Fab., *Necrophorus humator*, Fab., *Dermestes murinus*, L. and several Staphylinids were taken. Many beetle larvae were collected including *Orchesia micans*, Panz. in fungus, also *Tiresias serra*, F., *Elater balteatus*, L. and *Melanotus rufipes*, Hbst. under pine bark.

Snake-fly larvae (*Raphidia maculicollis*, Steph.) in various stages of growth were observed under the pine bark. Some had been parasitized by the Ichneumonid *Pyracon montanus*, Hart. (flies emerged 13th May). A nest of the ant *Leptothorax acervorum*, F. was found beneath an exposed pine root.

Under bark of a sycamore tree were found numerous cases of the larva of the Tortricid moth, *Pammene regiana*, Zell.

After tea the shallows between Effingham and Horsley were worked. The sky was cloudless and there was strong moonlight. Nevertheless a few moths were about. Apart from the commoner things *Taeniocampa gracilis*, Fab. was taken, also *Panolis griseo-variegata*, Goeze, (*piniperda*, Panz.), the latter however at plum blossom. Several nice specimens of *Selenia bilunaria*, Esp. were netted.

Mr. Wakely subsequently reported the following additional species *Taeniocampa munda*, Esp., *T. incerta*, Hufn., *T. stabilis*,

View., *T. pulverulenta*, Esp., *T. munda*, Esp. (sugar) and *T. gothica*, L., *Scopelosoma satellitia*, L., *Orrhodia vaccinii*, L., *Farophila badiata*, Schiff., *Enarmonia quadrana*, Hb., *Leptogramma (Acalla) literana*, L., *Chimabache fagella*, Fb., and *Semioscopis arellanella*, Hb., with the larvae of *Coleophora pyrrehulipennella*, Zell., swept from heather.

13th APRIL, 1933.

Mr. T. R. EAGLES, VICE-PRESIDENT, in the Chair.

Lt. C. G. Lipscomb, of Blackdown, Surrey, Mr. A. G. Peyton, of Ramsgate. and Mr. G. Walter, of Holmwood, were elected members.

Dr. Bull exhibited a *Taeniocampa munda*, Esp., with an almost complete row of spots in the submargin and a larva of *Ellopia fasciaria*, Schiff. (*prosapiaria*, L.).

Mr. S. Wakely exhibited larvae of the mongrel *Oporinia r.\* filigrammaria*, H.-S., with *autumnata*, Esp., from Durham; also of *Perconia (Crocota) strigillaria*, Hb., *Boarmia repandata*, L., and *Coleophora pyrrehulipennella*, Zell., swept off heather at Ockham on the occasion of the field meeting on 8th April.

Mr. B. MacNulty exhibited a short series of *Selenia bilunaria*, Esp. bred from ova obtained from a female caught at Alfriston in August, 1932.

Mr. Howarth read notes on the breeding and life-history of *Lachneis (Eriogaster) lanestris*, L. from Canvey Island, Essex.

Mr. Eagles exhibited young larvae of *Pachygastris trifolii*, Esp. from ova obtained by Dr. Bull on Dungeness. They preferred to feed on the yellow meadow-vetchling, *Lathyrus pratensis*, L. He also showed larvae of *Hipparchus papilionaria*, L. and *Boarmia roboraria*, Schiff. (birch) from Epping; larvae of *Ellopia fasciaria*, L. and the "ant beetle" *Thanasimus (Clerus) formicarius*, L. which is predaceous on beetles boring in pine; both from Effingham on the occasion of the Field Meeting on 8th April.

27th APRIL, 1933.

Mr. C. G. M. DE WORMS, PRESIDENT, in the Chair.

Mr. de Worms gave an account of a visit paid to Scotland and the North of England at Easter and made the following exhibits.—I. *Poecilopsis (Nyssia) lapponaria*, Boisd., ♀ and a batch of ova from

\* See Prout in Seitz IV. 196.

Rannoch, 15.iv.33. 2. *Nyssia zonaria*, Schiff., ♀ and ova from N. Wales, 21.iv.33. 3. Larvae of *Aplecta tineta*, Brahm., from Scotland, 12.iv.33. 4. Larvae of *Dasychira fascelina*, L., from Scotland, 10.iv.33. 5. Larvae of *Ellopiia fasciaria*, L. (*prosapiaria*, L.), from Rannoch, 13.iv.33. 6. Ova of *Endromis versicolora*, L., *in situ* from Aviemore, 13.iv.33. He also showed a series of paintings of lepidoptera by Mr. F. W. Frohawk.

Dr. E. A. Cockayne exhibited a wholly black larva of *Abraaxas grossulariata*, L., from Prof. J. W. Heslop Harrison of Newcastle-on-Tyne. It was a dominant. Buckler gives a figure of a black larva and reports the form as far back as 1878.

Mr. S. Wakely exhibited larvae of *Lithosia deplana*, Esp. and *Aventia flexula*, Schiff. from Box Hill, and also a luminous glow-worm larva.

Mr. S. N. A. Jacobs exhibited cocoons of a *Nepticula* sp. from *Salix* and contributed the following note:—

“These minute cocoons, bearing a resemblance to desiccated tomato seeds, are exhibited to illustrate a curious habit of many species of *Nepticula*, which, although they feed singly, rarely more than one larva in a leaf, though occasionally two may attack the opposite sides of the midrib, when the time comes for pupation, the larvae leave the mines, and although almost apodal, crawl about quite considerably before finally selecting their place for spinning the cocoon; these are usually in a small colony of six or eight.

“Possibly this habit of congregating for pupation may be traced to the suitability of the spot for pupation, but I favour the theory that it is to allow the pupae to be submitted to the same climatic conditions, and thus enable them to emerge simultaneously to facilitate pairing of these short-lived insects.”

Mr. T. R. Eagles exhibited the beetles taken by him at the Effingham Field Meeting on 8th April, *Dermestes murinus*, L., *Thanatophilus rugosus*, L., *Necrophorus humator*, Fab., *Lochmaea suturalis*, Thom. and *Anatis ocellata*, L.

Mr. O'Farrell exhibited *Miselia oxyacanthae*, L., *Calostigia (Malenydris) multistrigaria*, Haw., and *Oporinia dilutata*, Schiff., from Wimbledon and contributed the following note:—

The curious deformity of *Miselia oxyacanthae* has the tip of the left forewing concave, almost hooked, in shape, whilst the other wings are perfectly normal in size and shape. It was taken at sugar on Wimbledon Common on 15th Oct., 1932.

The five examples of *Calostigia (Malenydris) multistrigaria* show

that yet another species of Geometer is becoming black in the Wimbledon district. The first two specimens are more or less normal, the third has a great deal of yellow on the forewings, and the last two approach the Yorkshire form *nubilata*, Tutt.

Finally, the black ♀ *Oporinia dilutata* seems to approach the form *melana*, Prout., which occurs in the Midlands. It was found newly emerged on a hawthorn trunk in a Wimbledon garden last autumn.

Dr. Bull exhibited larvae of *Naenia typica*, L., *Lithosia deplana*, Esp., and *Oporinia autumnata*, Borkh. and reported *Hesperia malvae*, L. on 15th April, *Ematurga atomaria*, L. on 16th April, *Phragmatobia fuliginosa*, L. on 19th April and *Pararge aegeria*, L. on 20th April.

Mr. R. Adkin exhibited an example of *Biston betularia*, L. from Manchester, in which the whole of the black markings were replaced by a dull brown. He said that the specimen was taken with several others many years ago, and it had been suggested that their pale colour might have been caused by chlorine fumes from some of the bleaching works.

Mr. Bliss reported *P. aegeria*, L., *Pieris brassicae*, L., *Callophrys rubi*, L., *Polygonia c-album*, L., and *Leptosia sinapis*, L., as having already been seen on the wing.

29th APRIL, 1933.

FIELD MEETING—OXSHOTT.

Leader.—MR. C. N. HAWKINS, F.R.E.S.

This district has been the scene of many Field Meetings which have been fully reported in the past so that a fairly brief summary of the day's events will suffice on this occasion. The meeting was arranged in two sections, as whole- and half-day outings. It was well attended, 15 members and 1 visitor comprising the party, and in spite of a heavy shower in the morning, proved to be most enjoyable. The morning was spent in working the pine woods in the neighbourhood of the station, but after lunch the area worked was extended to the Black Pond, Esher, where some interesting species were taken.

Tea was obtained at the Rooms near the station and afterwards a few members, and the visitor, stayed on for evening work. Once again an especially good feature of the meeting was the enthusiasm

of the younger members: the extreme activity of one of the "heavy-weights" in pursuing, and occasionally netting, erratically moving specimens of *Bupalus piniaria*, L., etc., over rough ground, exciting great admiration, and (may I whisper it?) envy. Such enthusiasm promises well for the future of the Society and deserves encouragement. Insects captured need not, and indeed should not, be retained unless actually required but they can be definitely identified before release and thus their habits of flight and appearance on the wing may be noted for future occasions.

The following imagines, amongst others were taken or noted:—*Pieris brassicae*, L., *P. rapae*, L., *Dicranura vinula*, L. (a pair in cōp. on a Sallow bush), *Saturnia pavonia*, L. ♂♂, *Sarrothripa revayana*, Scop., *Panolis griseo-variegata*, Goeze, (*piniperda*, Panz.), *Anarta myrtilli*, L., *Cosymbia pendularia*, Clerck., *Xanthorhoë spadicearia*, Schiff. (*ferrugata*, Stdgr.), *Eupithecia nanata*, Hb., *Ectropis punctulata*, Schiff., *Ematurga atomaria*, L., *Bupalus piniaria*, L., and *Gelechia ericetella*, Hb. Also larvae and pupae of *Senta maritima*, Tausch., *Thera obeliscata*, Hb. and *Ellopiia fasciaria*, L., (*prosapiaria*, L.), and larvae of *Polyploca flavicornis*, L., *Nola cucullatella*, L., *Miselia oxyacanthæ*, L., *Noctua brunnea*, Fab., *N. primulae*, Esp., *N. triangulum*, Hufn., *Triphaena fimbria*, L., *Leucania straminea*, Treits., *Pseudoterpna pruinata*, Hufn., *Hipparchus papilionaria*, L., *Oporinia dilutata*, Schiff., *Thera firmata*, Hb., (1), *Crocallis elingvaria*, L., *Boarmia rhomboidaria*, Schiff., *B. repandata*, L., *Gnophos obscurata*, Schiff., and *Perconia strigillaria*, Hb. This gives 35 species of Lepidoptera and no doubt many more were seen but not reported.

Among Coleoptera, the weevil *Pissodes notatus*, Fb., was beaten from small Pines but no complete records for this or for any of the remaining Orders have been received.

Mr. Wakely subsequently reported the following additions to the above list.

Imagines of *Cnephasia musculana*, Hb., *Catoptria (Laspeyresia) ulicetana*, Haw., *Adela cuprella*, Thunb., *Incurvaria pectinea*, Haw., and larvae of *Cedestis farinatella*, Dup., and of *Coleophora pyrrhulipennella*, Zell.

11th MAY, 1933.

The PRESIDENT in the Chair.

The President gave a short account of the Centenary Meeting of the Royal Entomological Society of London, which he and Mr.

Eagles attended as delegates to present a congratulatory Address from the S. London Entomological and Natural History Society.

Mr. Downes exhibited a larva of *Abraeus grossulariata*, L., almost completely black, taken in Kensington Gardens. It was noted that however dark the larvae of this species might be, the resultant imagines were in no way remarkable for dark coloration.

Mr. E. J. Bunnett exhibited living larvae of three species of Coleoptera to illustrate Mr. Blair's paper, *Rhagium mordax*, De G., *Melanotus rufipes*, Hbst. and *Ocyopus olens*, Müll.

Mr. R. A. R. Priske exhibited three specimens of *Helix aspersa*, Mull. (Mollusca), an almost completely white form and a yellow form from High Wycombe, and a small and unusually marked form possibly caused by a disease, from Hanwell.

Mr. C. N. Hawkins exhibited larvae of *Leucania straminea*, Treit., obtained from the stems of dead reeds, and of *Gnophos obscurata*, Schiff., feeding on heather, from Oxshott.

Mr. Niblett exhibited examples of the "big bud" on currant caused by the mite *Eriophyes ribis*, Hal.

Mr. S. Wakely exhibited an Alder stem showing workings and emergence hole (cap) of *Synanthedon (Trochilium) spheciformis*, Schiff., from which a Hymenopterous parasite (also exhibited) had emerged; it was taken at Pamber Forest, Hampshire, by Mr. H. L. Dolton.

Mr. MacNulty exhibited a series of *Lycia hirtaria*, Clk., bred from ova laid by a Wimbledon female. The were generally paler than those from the Central London area. One example was of a pale brown. This species was noted as being scarcer than usual in the present season. A case was reported where 2 imagines had remained sitting on a fence in the same position for eight consecutive days.

Dr. Bull reported *Brenthis euphrosyne*, L., as being seen on 30th April this year in the West Kent area.

Mr. Blair then read the second portion of his paper on "Coleopterous Larvae." [See "Trans."]

In reply to questions Mr. Blair stated that the larvae of Coleoptera were perhaps not so generally subject to attack by parasites as the larvae of the Lepidoptera but certain species were regularly heavily parasitized. Generally speaking the Ichneumonids played a minor part in the parasitism of Coleoptera, the most numerous parasites being *Braconidae* and *Chalcididae*. The *Proctotrupidae* were also much more in evidence than with Lepidopterous larvae.

20th MAY, 1933.

## FIELD MEETING—CHILWORTH ST. MARTHA'S.

Leader.—C. G. M. DE WORMS, F.R.E.S., F.C.S., etc.

A party consisting of nine members of the Society assembled at Chilworth Station at 11.45. The conditions for collecting were ideal. The day was brilliantly fine and warm during the whole period, which afforded every opportunity of a good bag being obtained. The route taken was via the road leading from the level crossing over the Downs thence through a private estate, along the footpath which ascends direct to the Church at St. Martha's. From a bed of nettles by the side of the footpath several larvae of *Plusia chrysitis*, L., were beaten. Further along from the elm-trees larvae of *Calyptia affinis*, L., together with a few *C. diffinis*, L., were dislodged. When the summit of the ridge was reached the party distributed itself among the woodland for the purpose of larva beating and searching for insects on the foliage and tree trunks. From the oaks were obtained several larvae of *Hylophila bicolorana*, Fuessl. and *Strymon (Thecla) quercus*, L., while it was noticeable that most trees were defoliated by *Tortrix viridana*, L. Larvae of *Strymon (Thecla) w-album*, Knoch. were again fairly plentiful on the wych elms, but most of them had already turned colour and some pupae were found between the leaves. Quite a number of larvae of *Brachionycha sphinx*, Hufn. (*cassinea*, Hb.) were also beaten from the wych elms. There were plenty of insects on the wing. These included, all the "whites," *Euchloë cardamines*, L. of which ova were found on its foodplant, *Polygonia e-album*, L. of which some twenty were reported and one egg discovered on hop. Besides other common species there were a few *Lycaenopsis (Cyaniris) argiolus*, L. and *Brenthis euphrosyne*, L. The day-flying moths obtained or seen were *Acontia luctuosa*, Esp., *Thera variata*, Schiff. (from spruce) *T. obeliscata*, Hb., *Ectropis (Tephrosia) crepuscularia*, Hb., *E. punctulata*, Schiff., *Perizoma affinitata*, Steph., *P. flavofasciata*, Thnbg., *Lithina (Panagra) chlorosata*, Scop., (*petraria*, Hb.), *Ematurga atomaria*, L., etc.

Tea was obtained at the Station Hotel and afterwards several of the party stayed on for further collecting, some remaining till the dusking flight when a few more species were taken.

Mr. Howarth reported the following additional species: *Asthenia albulata*, Hufn. (*candidata*, Schiff.), and larvae of *Taeniocampa*

*stabilis*, View., *T. incerta*, Hufn., *T. pulverulenta*, Esp. (*cruda*, Treits.), *Scopelosoma satellitia*, L., *Calymnia trapezina*, L., etc.

Mr. Blair communicated the following additional captures.

LEPIDOPTERA:—*Eupithecia virgaureata*, Dbl., on a pine trunk, and *Depressaria costosa*, Haw., larvae in gorse shoots.

ODONATA:—*Agrion puella*, L. and *Calopteryx virgo*, L.

NEUROPTERA:—*Sialis lutaria*, L., *Panorpa germanica*, L.

RHYNCHOTA:—*Ledra aurita*, L. beaten from oak, *Triecphora vulnerata*, Ill. on low herbage. A specimen of the Coccid *Lecanium capreae*, L., subsequently produced the Chalcid *Blastothrix britannica*, Gir.

Mr. A. F. O'Farrell recorded the following additional species:—*Coenonympha pamphilus*, L., abundant, *Polyommatus icarus*, Rott., *Nisoniades tages*, L., *Hesperia malvae*, L., *Cosmotriche potatoaria*, L., a larva, *Spilosoma menthastris*, Esp., *Euclidia mi*, Clk., *E. glyphica*, L., *Pseudopanthera macularia*, L., *Acidalia floslactata*, Haw. (*remutata*, Schiff.), etc. and the micros *Adela degeerella*, L., *Micropteryx calthella*, L., etc.

25th MAY, 1933.

#### The PRESIDENT in the Chair.

Mr. C. W. Harris of Dartford was elected a member.

The President exhibited the young, green larvae of *Dimorpha (Endromis) versicolora*, L., from ova of Scotch origin, and living *Acrionicta aceris*, L., just taken when crossing Regent's Park. He reported that at the present time Butterflies as a whole were more forward than usual, the larvae of *Strymon w-album*, Knoch. had already pupated and at the Chilworth Field Meeting on 20th May Moths were abundant.

Mr. Dennis a series of photographs of galls to illustrate the paper subsequently read by Mr. Niblett.

Mr. Robert Adkin exhibited specimens of two species of fossil shells of Mollusca which he believed were known as *Venericardia planicosta* and *Turritella sulcifera*. He said that during the excavations for the dock extensions at Southampton these shells were brought up in great numbers, and he understood that they were of considerable interest, for although it was known that they occurred abundantly in certain deposits, it was not often that the strata in which they were to be found were exposed.

Mr. K. G. Blair exhibited the following Cecid galls in connection with Mr. Niblett's paper :

1. *Cecidomyia inclusa*, Frfld., galls on walls of gall-chambers of the Dipteron *Lipara lucens*, Meig., on Common Reed.

2. *C. inclusa*, Galls on Reed stem with no *Lipara* galls.

3. *C. sp. ?* from the same galls, but the larva not a gall-maker, but living freely between the rolled leaves of the *Lipara* gall.

4. *C. saliciperda*, Duf., from galls on Sallow, together with Chalcid and Proctotrupid parasites.

5. *Semudobia betulae*, Winn., and galled fruits of Birch.

6. *Mycococis ovalis*, Edw., galled fungi on rotten wood.

Mr. Bliss exhibited living larvae of the following species from the Essex Coast: *Friogaster lanestris*, L., *Malacosoma neustria*, L., *Trichiura crataegi*, L., and *Nygmia phaeorrhoea*, Don. (*chrysoorrhoea*, Hb.).

Dr. Bull reported that *Leptosia sinapis*, L. was already out and Mr. Stanley-Smith had taken larvae of *Polia chi*, L., *Zygaena trifolii*, Esp., and *Taeniocampa populeti*, Treits. and reported larvae of *Polyphoca diluta*, Fab., and on oak abundance of *Tortrix viridana*, L.

Mr. Eagles exhibited the following Coleoptera taken at the Oxshott Field Meeting (29.iv.1933). *Rhagium bifasciatum*, Fab., *Cicindela sylvatica*, L., *C. campestris*, L., *Anatis ocellata*, L., *Mysia oblongoguttata*, L., *Coccidula scutellata*, Hbst., and *Leistus fulvibarbis*, Dej.

Mr. M. Niblett exhibited numerous midges and the galls produced by them and then read his paper entitled "Gall Midges and their Galls." [See "Trans."]

8th JUNE, 1933.

The PRESIDENT in the Chair.

Mr. R. P. Demuth of Holland Park was elected a member.

Mr. C. G. M. de Worms exhibited larvae of *Leucoma salicis*, L. from S. London, and of *Spilosoma urticae*, Esp. from a last August pairing of the Norfolk Broads. He called attention to the early appearances of various species this season. *Plebeius aegon*, Schiff. was out in Dorset on 6th June. *Epinephela jurtina*, L., *Dyscia fagaria*, Thunbg. (*belgiaria*, Hb.) and *Hemithea viridata*, L., on 5th June in the New Forest. *Brenthis selene*, Schiff. and *Stauropus fagi*,

L. in the New Forest on 6th June. *Acronieta alni*, L. and *Lithosia quadra*, L. were both fairly numerous in the last locality.

Mr. D. G. Sevastopulo exhibited a series of 53 specimens of the dry season form *ismene*, Gr. of the Satyrid *Melanitis leda*, L., set to show the variation of the underside. An example of the wet season form was also included to shew the seasonal dimorphism.

Mr. M. Niblett exhibited some *Trypetidae* and several species of Gall-wasps and read notes on their habits.

TRYPETIDÆ:—*Phagocarpus permundus*, Har. (*Anomoea antica*, Walk.). Larvae in fruit of *Crataegus monogyna*, Jacq., 10th Sept., 1932; these left the fruits 12th November, and pupated. Flies emerged from 25th May to 3rd June, 1933. This species has been recorded from Mid and North Europe, with the larvae feeding in the fruit of *Crataegus oxyacantha*, L., and *Cotoneaster tomentosa*, Lind. Perris stated that the larvae pupated in the fruit, while Handlirsch stated they pupated in the earth. Locality, Epsom Downs, Surrey.

CYNIPIDÆ:—*Phanacis centaureae*, Först. The cause of an obscure gall in the stems of *Centaurea scabiosa*, L. The insects emerged during June. Locality, Cambridgeshire.

*Aylax papaveris*, Perr. This species galls the seed-capsules of *Papaver rhoeas*, L., it appears to be extremely local. Found near Newhaven in August, 1929, again in August, 1932, at Ranmore Common; insects from these latter galls emerged from 20th May to 6th June, 1933.

Dr. K. G. Blair exhibited a small twig of aspen (six leaves on this year's shoot) from Oxshott, with 15 eggs of *Dicranura vinula*, L. (4, 1, 1, 0, 3, 0 on the leaves and 6 on the stem). These eggs subsequently proved to be parasitized by the Proctotrupid *Telenomus bombycis*, May. He also showed larvae of *Lina populi*, L., on aspen, Oxshott, and on behalf of Mr. Hugh Main larvae of the Lampyridae, *Luciola lusitanica*, Charp. and *Phausis delarouzei*, du Val., from Menton, S. France, and remarked on their luminous properties.

Mr. T. R. Eagles exhibited the following COLEOPTERA: *Pyrochroa serraticornis*, Scop., *Phyllopertha horticola*, L., *Leipopus nebulosus*, L. and *Byrrhus pilula*, L. from Chilworth Field Meeting (20.v.33); together with the Lepidopterous larvae: *Notodonta trepida*, Esp. (Dorset), *Perizoma flavofasciata*, Thunbg. (*decolorata*, Hb.) (Chilworth), and *Orgyia gonostigma*, Fab. (Brentwood ova) and remarked that breeding *Erastria fasciana*, L. from ova deposited by a female taken at Broadwater Forest had proved successful, and moths had emerged freely notwithstanding the long time of the pupal stage.

Mr. J. A. Downes exhibited a fox-glove, the top florets of which were fixed into one large inverted cup-like flower; Dr. Cockayne remarked that this growth was a Mendelian recessive, and Mr. Grosvenor remarked that the malformation was not uncommon and that the plants so affected bred true from seeds. Mr. Jacobs also noted that he had two such specimens in his garden.

Mr. J. P. R. Heslop remarked on the large number of immigrant *Pyrameis atalanta*, L., *P. cardui*, L. and *Colias croceus*, Fourc. that had come under his notice.

10th JUNE, 1933.

FIELD MEETING—WARLEY COMMON, BRENTWOOD.

Leader.—MR. T. R. EAGLES.

This meeting was favoured with good weather. There was no rain and the heat wave had given way to comfortable conditions for working. By the calendar the meeting was one day earlier than the meeting at the same spot in 1932, but the effects of the earlier season of 1933 were evident. For example, while in 1932 nests of young larvae of *Taeniocampa miniosa*, Fab. were freely found, in 1933 very few such larvae were obtained and these had left their nests. That the species has still a strong hold here was clear from the many deserted nests with cast skins of young larvae.

This year only one larva (full-fed) and one pupa of *Orygia gonostigma*, Fab. were taken.

It is pleasing to report that three members took imagines of *Erastria venustula*, Hb. in the afternoon. This success encouraged a return visit after tea, but no more were secured.

Beating oak produced the following larvae:—*Drymonia chaonia*, Hb., *Cymatophora ridens*, Fab., *Asphalia diluta*, Fab., *Malacosoma neustria*, L., *Sarrothripa revayana*, Scop., *Eupithecia abbreviata*, Steph., *E. dodoneata*, Gn., *Ennomos erosaria*, Borkh., *Pachys strataria*, Hufn. and *Euchloris pustulata*, Hufn.

Other miscellaneous larvae taken included *Lophopteryx camelina*, L., *Bombycia viminalis*, Fab., *Gonepteryx rhamni*, L. and *Eumichtis protea*, Borkh.

A fine specimen of *Plusia pulchrina*, Haw. was found resting head upwards on a rush.

Dr. K. G. Blair reported the following:—NEUROPTERA.—*Chrysopa*

*perla*, L., *C. ventralis*, Curt., *Hemerobius micans*, Oliv., *Semidalis aleurodifformis*, Steph.

COLEOPTERA.—*Balaninus nucum*, L., *B. venosus*, Grav., *Balanobius salicivorus*, Payk., *Attelabus nitens*, Scop., *Leiopus nebulosus*, L., *Strangalia maculata*, Poda, *Luperus longicornis*, F., *Athous hirtus*, Hbst., and *Dolopius marginatus*, L.

Mr. Wakely reported the following Microlepidoptera, *Cryptoblates bistriga*, Haw., *Cacoecia sorbiana*, Hb., *Ancylis uncana*, Hb., *Lathronympha hypericana*, Hb., and *Gracillaria alchemiella*, Scop., with pupae of *Tortrix loeflingiana*, L., and *Scythropia crataegella*, L.

18th JUNE, 1933.

FIELD MEETING—BROADWATER FOREST.

Leader.—DR. G. V. BULL.

In spite of the stormy weather of the morning, the meeting held in Broadwater Forest on 18th June was successful and enjoyable. Twelve members attended. The more wooded western portion of the area was worked in the morning and lunch was taken under a clump of beeches. The afternoon weather was more favourable and the party worked across the more open portion eastwards meeting for tea at the High Rocks Hotel. Thirty seven species of Macrolepidoptera were noted, 26 imagines and 11 larvae. *G. rhamnii*, L., being found in both stages. The more noteworthy species were *Diacrisia sanio*, L., *Cybosia mesomella*, L., *Acrionicta leporina*, L., *Aplecta tineta*, Brahm., *Lithacodia (Erastria) fasciana*, L., *Odezia atrata*, L., *Thera firmata*, Hb., *Eulype hastata*, L., *Euchoeca obliterata*, Hufn., *Semiothisa (Macaria) notata*, L., *S. literata*, Clk., *Boarmia roboraria*, Schiff., *B. consortaria*, Fab., *Bupalus piniaria*, L. and *Perconia (Aspitates) strigillaria*, Hb.

The Micros included *Aphomia sociella*, L., *Perinephele lancealis*, Schiff., *Eretria pinicolana*, Dbl. (pupae), *E. pinivorana*, Zell., *Argyroploce corticana*, Hb., *Eroteleia dodoecella*, L., *Cedestis farinatella*, Dup., and the very local *Cedestis gysseleiniella*, Dup.

Among the larvae taken were *Lophopteryx camelina*, L., *Sarrothripa revayana*, Scop., *Polyploca flavicornis*, L., *Demas coryli*, L., *Panolis griseovariegata*, Goeze (*piniperda*, Panz.), *Pachnobia rubricosa*, Fab., *Anarta myrtilli*, L., *Brephos parthenias*, L. and *Thera obeliscata*, Hb.

A few Coleoptera were taken including *Hylobius abietis*, L.,

*Bembidion ustulatum*, L., *Clytra quadripunctata*, L. and *Lupeus longicornis*, Fab.

An adder (*Vipera berus*, L.) of an unusual reddish colour was noted by one of the party.

22nd JUNE, 1933.

The PRESIDENT in the Chair.

Mr. de Worms exhibited larvae of *Calocampa vetusta*, Hb. from Aviemore.

Mr. Priske exhibited specimens of the fossil shells of the sinistral form of *Helix nemoralis*, L., from the Holocene deposits of Bundoran, Co. Donegal, Ireland, a local form which apparently has long died out.

Mr. M. Niblett exhibited a cocoon of *Saturnia pavonia*, from Brockenhurst, from which 20 Ichneumons emerged, between 14th-21st June, 1933; the larva completed the construction of the cocoon before it succumbed.

Mr. T. R. Eagles exhibited a Photograph of the Delegates to the Centenary Celebration of the Entomological Society of London at which Mr. de Worms and himself represented the South London Entomological Society.

Mr. S. N. A. Jacobs exhibited *Aphomia gularis*, Zeller, recently recorded as a British species, taken in Fen Court, E.C.3, 9.vi.33. He noted that the sitting position with forelegs at full length and head and palpi thrown back is typical of *Aphomia sociella*.

Mr. D. G. Sevastopulo exhibited dwarf examples of the following species of Indian Rhopalocera with normal-sized examples for comparison. The length of the costal margin of the forewing in millimetres is given in each case.

|                                                              | Dwarf     | Normal |
|--------------------------------------------------------------|-----------|--------|
| <i>Chilasa clytia</i> , L. ... ..                            | 34 ...    | 48     |
| <i>Papilio polytes</i> , L., ssp. <i>romulus</i> , Cr. ♂ ... | 32 ...    | 44     |
| <i>Euchloë cardamines</i> , L. ... ..                        | 16 ...    | 21     |
| <i>Pieris napi</i> , L. ♂ ♀ ... ..                           | 16-17 ... | 22-23  |
| <i>Pieris canidia</i> , Sparr., ssp. ♀ ... ..                | 22 ...    | 27     |
| <i>Catopsilia pomona</i> , Fb., ♂ ... ..                     | 22 ...    | 36     |
| <i>Colias croceus</i> , Frey., ssp. <i>edusina</i> , Btlr. ♂ | 20 ...    | 24     |
| <i>Danais chrysippus</i> , L. ♂ ... ..                       | 30 ...    | 36     |
| <i>Precis almana</i> , L. ♀ ... ..                           | 20 ...    | 28     |

Dr. Cockayne exhibited a specimen of *Brenthis selene*, Schiff., which had been caught by the adhesive tentacles of the sundew, *Drosera rotundifolia*, L., from Surrey, 10.vi.33.

Mr. H. W. Andrews exhibited the Diptera *Chiastochaeta trollii*, Zett., from Yorkshire, and *Opomyza lineatopunctata*, v. Bor., from Lancashire, taken by Mr. H. Britten. The former Anthomyiid fly is attached to the Globe flower, *Trollius europaeus*, L., a mountain plant growing sparingly in the North West. The larvae live gregariously in the flower buds, the imagines are apparently only found on or near the plants.

Mr. Turner, on behalf of Mr. Siviter Smith, exhibited two photographs of a gate in Cornwall made from timber, which had been extensively attacked by the larvae of *Sirex gigas*, L. The damage was most extensive and thorough. He also showed a photograph of the var. *esmeralda*, Oberth. of *Plusia moneta*, Fab., previously exhibited and an aberration of the same species in which the reniform stigma was much enlarged irregularly.

Mr. Robert Adkin exhibited two specimens of *Nepticula decentella*, H.S. He said that on 5th August, 1931, he took from the stem of a sycamore tree in his garden at Eastbourne a Nepticulid that was quite unlike any species with which he was acquainted, and which ultimately proved to be *decentella* of Herrich-Schäffer, a species that had not previously been taken in Britain. On 5th June, 1933 another specimen was found in a light trap that was in operation within a few yards of the spot where the first specimen was taken. On the Continent the larva feeds in the seeds of the sycamore and he thought it probable that the species was breeding somewhere in his neighbourhood.

Mr. O'Farrell exhibited larvae of the Aegeriid, *Synanthedon myopiformis*, Borkh., and a larva of *Malacosoma neustria*, L. from Wimbledon.

Mr. S. Wakely exhibited living larvae of *Pachnobia rubricosa*, Fab. and of *Catocala nupta*, L., feeding on poplar, together with young larvae of *Euchloris smaragdaria*, Fab. from ova laid by a female sleeved on a plant of *Artemisia maritima*, L. in his garden.

Mr. C. N. Hawkins exhibited the larvae of *Luperina cespitis*, Fab. from Box Hill; the green coloured larvae of *Amathes lychnidis*, Hb. (*pistacina*, Fab.), and the larvae of *Hemaris fuciformis*, L. bred from ova found wild at Horsley.

Mr. J. A. Downes exhibited the dark coloured and the green forms of the larvae of *Lycia hirtaria*, Clk.

Mr. T. R. Eagles exhibited various forms of the same species of larva with parasites he had bred from some of them. He also showed larvae of *Eupithecia abbreviata*, Steph. and of *Drymonia chaonia*, Hb. from Brentwood, obtained during the field meeting, and of *Calocampa solidaginis*, Hb. from Arran. He also showed the Coleoptera *Balaninus venosus*, Gn., *Dolopius marginatus*, L., *Luperus longicornis*, Fab. and *Attelabus nitens*, Scop. from Brentwood.

Mr. Turner reported various occurrences of the immigrant species *Pyrameis cardui*, L., *P. atalanta*, L., *Plusia gamma*, L., etc. *Argynnis adippe*, L., was reported as present in St. Leonard's Forest on June 13th.

Mr. C. G. M. de Worms read a Report of the Field Meeting at Chilworth on 20th May.

Mr. T. R. Eagles read a Report of the Field Meeting at Brentwood on 10th June.

Mr. C. N. Hawkins read a Report of the Field Meeting at Oxshott on 29th April.

9th JULY, 1933.

FIELD MEETING—FOREST ROW.

Leader—MR. S. N. A. JACOBS.

This very beautiful part of Sussex was visited by a party of ten, including Lepidopterists, a Coleopterist and a Hymenopterist, who arrived by various means, at the spot chosen for the start of operations, between 10.30 and midday.

The district worked was the woods and open moorland on the right of the Forest Row-Lewes road, opposite Hindleap Warren, consisting of mixed woodland, chiefly oak, with interspersed sallow and conifers with occasional chestnuts, and birch clumps on the open country, which is mostly deep in sphagnum moss with rank grass, and in the moister places, Bog Asphodel and Sun-dew, studded with firs, patches of Dwarf Sallow, and stunted Sallow and Aspen, the last two of which yielded many larvae of *Pygaera pigra*, Hufn. and one or two *Dicranura vinula*, L., and one young larva and one egg of *D. bifida*, Hb.

The butterflies noted were *Limenitis sibilla*, L., which was perhaps the most plentiful insect on this spot; *Aphantopus hyperantus*, L., *Strymon quercus*, L. (a male and a female of which were taken, and

a pupa found under the bark of a log which was being examined for beetles, and which hatched out the following day producing a slightly crippled male); *Coenonympha pamphilus*, L., *Pieris brassicae*, L., and *P. napi*, L., *Gonepteryx rhamni*, L. (pupa); *Rumiccia phlaeas*, L., *Dryas paphia*, L., *Argynnis aglaia*, L., *Brenthis selene*, Schiff., worn, were all in evidence.

The moths seen were *Ortholita mucronata*, Scop. (*plumbaria*, Fab.), which was in very fresh condition, and good number; *Phytometra viridaria*, Clerck., several species of *Argyresthia*; *Erroteleia* (*Gelechia*) *dodecella*, L., and *Crambus ericellus*, Hb. A *Notodonta trepida*, Esp., larva was beaten from oak; and on the strength of an old entomologist's sketch map, larvae of *Endromis versicolora*, L., were sought, though, possibly owing to the lateness of the meeting, but probably owing to the insect having disappeared from its old haunts, these were not forthcoming.

Weather conditions were pleasant, if not actually favourable to collecting, for although there was bright sunshine nearly all day, this was accompanied by a fairly stiff South West wind.

Members worked steadily up to about 5.30, when they retired to Forest Row for tea, after which, having discussed their individual catches, they went their several ways home after a most enjoyable day in this almost unspoilt part of England.

13th JULY, 1933.

The PRESIDENT in the Chair.

Mr. R. Hutchings, of Mitcham, and Capt. E. S. A. Baynes, of Compton, Guildford, were elected members.

The President exhibited Lepidoptera taken by him in Scotland and the North of England in April last, including *Dimorpha* (*Endromis*) *versicolora*, L., ♂♂, Aviemore; series of *Taeniocampa gothica*, L., with f. *gothicina*, H.-S., Aviemore and Struan; *Panolis griseo-variegata*, Goeze (*piniperda*, Panz.), the Scotch grey-green form; *Pachnobia rubricosa*, Fab., with f. *mucida*, Esp., Aviemore and Struan; *Nothopteryx* (*Lobophora*) *carpinata*, Borkh., a very fine banded form from Aviemore; *Lampropteryx suffumata*, Schiff., with the melanic form *piceata*, Steph., from Struan; *Poecilopsis* (*Nyssia*) *lapponaria*, Boisd., ♂♂ from Struan, and *Nyssia zonaria*, Schiff., from Conway.

Mr. A. W. Dennis exhibited dorsal and lateral views of the imago of *Pterophorus galactodactyla*, Hb.,  $\times 5$ , with the stereoscope.

Mr. H. Moore exhibited the Dipteron *Echinomyia* (*Tachina*) *grossa*, L., and read the following note:—"This forbidding and much figured fly is the largest Tachinid found in Europe. It is described as a well known New Forest fly, and as frequent in Cornwall and Devon, yet some collectors seem never to have met with it. With one exception, I have found no reference to its life-history, neither can I recall any Magazine notes, the exception is in Step's "British Insect Life" (p. 236). He says "Many lepidopterists have been disappointed in their hopes of seeing a fine butterfly or moth emerge from a chrysalis when this huge fly broke out instead"—Now I have a recollection of seeing somewhere that *E. grossa* is parasitical on Humble Bees,\* and my own experience suggests it. Some few years back we had a Field Meeting at Peaslake, when I saw and captured one that was following a Humble-bee, just as I have seen a smaller species after one of the Spring bees (*Andrenidae*), and boxed both at the entrance of the burrow."

He also exhibited *Ctenophora pectinicornis*, L., and read the following note:—"I exhibit a species of Diptera, which though described as common, does not seem to be too well known to some of us. Neither, so far as I have seen, is much to be gleaned of their life histories from the books I have consulted. The first, found by Mr. Wakely in his beating-tray at our Field Meeting in Broadwater Forest (18.vi.33), is one of the Crane Flies (*Tipulidae*) but differs from them in its more ornate colouring, and in the male having pectinated antennae, hence both its generic and specific names *Ctenophora pectinicornis*. Its flight is also swifter and more direct, and may be mistaken for an Ichneumon-fly, as happened to myself. The larva feeds on rotten wood. I have put in the box a ♀ which may be this species, but from the other side of the Channel."

Mr. Robert Adkin exhibited specimens of *Cacoecia* (*Tortrix*), *crataegana*, Hüb., and *C. (T.) sorbiana*, Hüb., taken in Abbot's Wood on 18th June last. He said that Abbot's Wood is one of the well known localities for *C. crataegana*, but, so far as he was aware, there was only one previous record of the capture of *C. sorbiana* in that district. On the morning of the above mentioned date he, with

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\* *E. grossa* is a well known parasite of *Macrothylacia rubi*, *Lasiocampa quercus* and other large Lepidopterous larvae, and has no connection with Humble-bees.—K.G.B.

three or four members of the Entomological Club, visited the wood. The day was dull, but from time to time the sun shone briefly and a fresh south-westerly breeze was blowing. In parts of the wood that were sheltered from the wind both species were found quite commonly resting fully exposed on the fronds of the bracken (*Pteris aquilina*, L.). Of the two *sorbiana* was the more common and one or two pairs were found *in cop.* Of *Argyroploce arcuella*, Clerck, (*Roxana arcuana*, L.), a species which is said to have the habit of sitting on the bracken fronds in full sunshine, two or three specimens also were found.

Mr. T. R. Eagles exhibited a larva and pupae of *Ligdia adustata*, Schiff., from Galley Hill, Waltham Cross, Essex. He said that there were only about half a dozen bushes of the *Euonymus europæus*, but each bush had numerous larvae in all stages of growth. The larvae fed very rapidly and reached pupation with only a single loss by parasites. They hang somewhat strongly and could probably be collected by discreetly jarring the bushes and picking off the suspended larvae. He also showed three larvae of *Pterostoma palpina*, L., from Bayford, Herts. In each case the larva had eaten the terminal half of an aspen leaf save the midrib, and was resting on the exposed portion of the midrib. He also showed the Coleoptera taken at the Ashdown Forest Field Meeting on 9.vii.1933.

Mr. Niblett exhibited the CECIDOMYID: *Contarinia pisi*, Winn. The larvae feed gregariously in the pods and flowers of cultivated peas during July and August, the midges emerging in June of the following year; and the TRYPETID: *Tephritis vespertina*, Lw., of which the larvae feed and pupate in the flower-heads of *Hypochaeris radicata*, L., during June and July, the flies emerging in the same months.

Mr. T. G. Howarth exhibited *Dryas paphia*, L., taken at Effingham on 2nd July.

Mr. S. R. Ashby exhibited the following rare and local species of Coleoptera presented to the Society's collection by Mr. H. St. J. Donisthorpe. They were all species which had previously been unrepresented in the Society's cabinet; many of them had been added by Mr. Donisthorpe himself to the British list. *Pterostichus angustatus*, Duft., *Anchomenus 4-punctatus*, de G., *Helophorus nanus*, Steph., *Euryusa sinuata*, Er., *Batrisodes (Ceuthorrhinchus) delaportei*, Kb., *Laemophloeus bimaculatus*, Payk., *Sylvanus mercator*, Fauv., *Atomaria pulchra*, Er., *Agrilus sinuatus*, Ol., *Throscus carinifrons*, Bonv., *Elater rufipennis*, Steph., *E. nigerrimus*, Lac., *Athous rhombeus*, Ol., *Dasytes flavipes*, Ol., *Tillus elongatus*, L.,

*Lymexylon navale*, L., *Ernobius mulsantiannus*, Shp., *Cis fuscatus*, Mell., *Ceuthorrhynchus angulosus*, Boh., *Dryophthorus corticalis*, Payk., and *Tomicus suturalis*, Gyll.

Dr. G. V. Bull exhibited several *Abraxas grossulariata*, L., bred from larvae found in the Zoological Gardens. Three specimens approximated to the form *hazeleighensis*, Raynor, in which the central area between two orange-yellow bands is filled in with brown-black; one specimen had the usual black pigment very deficient.

Mr. C. N. Hawkins exhibited a series of *Macrothylacia rubi*, L., and contributed the following note;—"The specimens were bred at the end of May, 1933, from larvae found 29.ix.1932 on Wimbledon Common. The 5 specimens shown (3 ♀ ♀ and 2 ♂ ♂) are the product of half a dozen larvae picked up at random, the remaining larva having produced a crippled pupa (♀) from which the imago, although fully developed, failed to emerge. The interest of the exhibit lies in the high proportion of emergences obtained. The larvae were wintered out of doors in an ordinary flower-pot 10" in diam., covered with gauze net and placed under some bushes in a fairly sheltered corner of the garden. The pot was stood upon a triangle of 3 bricks and had stones, etc., in the bottom to ensure free drainage. It was about half filled with sandy earth, then an inch or so of potting peat with a layer of dried bracken on top. The larvae wintered in the peat and spun up amongst the bracken in the spring."

Dr. Cockayne exhibited a number of preserved larvae of pine-frequenting species to illustrate the subsequent remarks of Mr. Downes on the specialised and protective coloration shown in these species.

The Report of the Field Meeting at Forest Row on July 9th was read by the leader, Mr. Jacobs.

It was noted that *Orygia antiqua*, L., was again abundant in the larval form in the London Parks and that *Leucoma salicis*, L., larvae were abundant on the poplars on Hackney Marshes.

16th JULY, 1933.

FIELD MEETING—SOUTH BENFLEET.

Leader—Mr. S. WAKELY.

About a dozen members met at Benfleet Station on the above date, and in the course of their ramble some interesting local insects

were taken. A start was made along the sea wall, proceeding eastwards, and imagines of *Adopaea* (*Pamphila*) *lineola*, Ochs., were soon captured. This species was noted in some numbers, with a few specimens of *A. flava*, Brün. (*thaumas* Hufn.). *Phthorimaea* (*Lita*) *obsoletella*, F.v.R., was disturbed by dozens when walking on the Salterns. An interesting find was the larvae (just hatched) of *Euchloris smaragdaria*, Fab., on Sea Wormwood. After lunch, the party spread out, some of the members crossing the railway and working the higher ground, where *Melanargia galathea*, L., was flying in numbers. The other members proceeded to search for pupae of *Nonagria geminipuncta*, Haw., in the reed stems which grew abundantly in some of the dykes to the landward side of the sea-wall. A good number were found, but it was noticed that great care was required in the search, or the result was tragic. A fat pupa cut in halves is rather a disappointment to the finder! While working the reeds, single specimens of *Leucania phragmitidis*, Hb., and *Leucania straminea*, Treits., were taken, and a single specimen of *Acidalia* (*Leptomeris*) *immutata*, L., was netted on the sea-wall. Various specimens of other orders were taken, including the local grasshopper *Metrioptera roeselii*, Hgnb. Tea was eventually partaken of at the Hoy Inn, after an enjoyable day's collecting in nice weather. The Lepidoptera taken included, besides those already mentioned, the following species, *Lithosia complana*, L., *Palimpsestis or*, Fab. (larvae), *Zygaena filipendulae*, L., *Cataclysta lemnata*, L., *Pyrausta purpuralis*, L., *Phalonia tesserana*, Treits., *Eucosma fulvana*, Steph., *E. trigeminana*, Steph., *Homocosoma sinuella*, Fab., *Hemimene petiverella*, L., and *Batrachedra praeangusta*, Haw.

Mr. Eagles reported captures of the following coleoptera:—*Malachius marginellus*, Ol., *Demetrias imperialis*, Germ., *Anthonomus rubi*, Hbst., *Dolichosoma lineare*, Ross., *Anthicus antherinus*, L., and *Creophilus maxillosus*, L.

Dr. K. G. Blair recorded the following:—

ORTHOPTERA.—*Metrioptera roeselii*, including the second recorded British specimen of the macropterous form *diluta*, Charp., *Conocephalus dorsalis*, Latr., *Phasgonura viridissima*, L., *Chorthippus elegans*, Charp.

ODONATA.—*Lestes dryas*, Kby., *Ischnura elegans*, Lind., and a teneral example of a *Sympetrum* (? *S. sanguineum*, Müll.) which was released.

TRICHOPTERA.—*Grammotaulius nitidus*, Müll.

COLEOPTERA.—From the the dykes; *Dyschirius salinus*, Schaum.,

and *D. luedersi*, Wagn., *Bembidion* spp., *Bledius spectabilis*, Kr., *Coccidula scutellata*, Herbst., *Leptura livida*, F. (on flowers of yarrow). From the mudbanks on the Saltings; *Heterocerus flexuosus*, Steph., *H. maritimus*, Guér., *Trogophloeus foreolatus*, Sablb., *Dichirotrichus pubescens*, Pk. Beaten from Mallow; *Apion malvae*, F., *A. rufirostre*, F., *A. radiolus*, Kby., *A. aeneum*, F. and *Podagrica fuscicornis*, L.

HYMENOPTERA.—Parasites.—A group of cocoons of *Apanteles* sp. was found in a reed with the remains of a larva of *N. geminipuncta*, also the cocoon of a larger solitary parasite in another reed. Pupae apparently of *D. fissipuncta*, under loose bark on willow, were accompanied by groups of cocoons of *Micropitis*, sp. One pupa had the apex removed, probably by a *Pimpla* sp.

Gall-flies.—Many of the reeds were found with the cavities almost filled with the galls of *Cecidomyia inclusa*, Frau. (see E.M.M., 1932, p. 11, and these Proceedings 25th May).

HEMIPTERA.—*Podops inuncta*, F., beneath *Statice limonium*, *Piesma quadrata*, Fieb., on *Beta maritima* and other plants.

27th JULY, 1933.

#### The PRESIDENT in the Chair.

Mr. S. Wakely exhibited the larvae of *Acidalia floslactata*, Hb. (*remutata*, Hb.); he had also bred *P'grausta aurata*, Scop., and *Eurrhynpara urticata*, L., from catmint, Box Hill; the *P. aurata* were very dark. He had bred *Arctia caja*, L., from a very dark ♀, the offspring were rather dark only.

Dr. Bull exhibited larva and pupa of *Brenthis selene*, Schiff., pupae of *Cosymbia porata*, Fab., and reported *Colias croceus*, Fourc., at Ringmer on 9th July, *Pyrameis atalanta*, L., on 20th July, *P. cardui* on 25th July. He then read the following note on a holiday he spent at Rannoch:—

“I spent a very profitable entomological holiday at Kinloch Rannoch from 21st June to 7th July of this year. In the day time *Polyommatus icarus*, *Ortholitha mucronata*, Scop. (*plumbaria*, Fab.), *Odezia atrata*, L., and *Perizoma albulata*, Schiff., were abundant in meadows near the river. A few *Brenthis selene*, Schiff., and *Diacrisia sanio*, L., were found near Tummel Bridge; a fair number of *Aricia medon*, Esp., var. *artaxerxes*, Fab., were seen a little higher up, but mostly in poor condition. *Erebia epiphron*, Knoch (males only),

and *Coenonympha tiphon*, Haw., were plentiful on the higher ground, and *Psodos coracina*, Esp., was flying in numbers in the sun in its locality 1500 feet above the lake. The larvae of *Lasiocampa quercus*, L., f. *callinae*, Palm., and *Saturnia pavonia*, L., usually so easy to find were very scarce, and I only saw one of each. Small larvae of *Palimpsestis or*, Fab., and ova and small larvae of *Amorpha populi*, L., *Dicranura vinula*, L., and *Pheosia tremula*, Clk., were found in fair numbers on a group of poplars by the river. The long light nights had no effect on the numbers of moths coming to sugar. The most frequent visitors were *Noctua primulae*, Esp. (in great variety), *Triphaena pronuba*, L., *Aplecta (Eurois) prasina*, Fab., *A. occulta*, L., *Mamestra thalassina*, Rott., *Hadena pisi*, L., *H. adusta*, *Xylophasia rurea* and *X. monoglypha*, both in great variety, *Phytometra viridaria*, Clk., and *Boarmia repandata*, L. Less common captures were *Mamestra contigua*, Vill., *Hadena rectilinea*, Esp., *Euphyia bilineata*, L., *Ellopija fasciaria*, L. (*prosapiaria*, L.), and *Entephria caesiata*, Schiff. On the south side at the edge of Black Wood the flowering rushes provided a rich harvest chiefly of *B. repandata*, L., *Lygris populata*, L., and *N. primulae*, Esp. Two fresh species at sugar were *Naenia typica*, L., and *Noctua augur*, Fab. On the wing at dusk *Pylarge ternata*, Schrnk. (*fumata*, Steph.), *P. viridaria*, Clk., *Campaea margaritata*, L., were the commonest insects."

Mr. T. R. Eagles exhibited larvae of *Hyloicus pinastri*, L., from Dorset and the Coleoptera taken by him at the Benfleet Field Meeting, 16.vii. 1933, as follow—*Malachius marginellus*, Ol., *Demetrias imperialis*, Germ., *Anthonomus rubi*, Hbst., *Dolichosoma lineare*, Ross., *Anthicus antherinus*, L., and *Creophilus maxillosus*, L.

Dr. K. G. Blair exhibited a number of Chalcids, *Pteromalus puparum*, L., reared from a single pupa of *Pieris brassicae*, L., from the south of France. Mr. Hugh Main had observed a Chalcid on the freshly formed pupa which he subsequently presented to me. In all 231 of the parasites emerged, 224 of them being ♂♂. All escaped through a single hole in one wing pad. This habit seems frequent for the species as I have one pupa each of *Pieris rapae*, L., and *Vanessa urticae*, L., similarly treated, but another pupa of *V. urticae* has 4 exit holes of the parasites. Unfortunately I have omitted to take notes of the numbers of the parasites or the proportions of the sexes in these cases.

Also a living ♂ specimen, very small, of *Hemerophila abruptaria*, Thunbg., which emerged on 25th July from an egg laid in May.

He also stated that 2 examples of *Acrioneta rumicis*, L., had emerged on 17th July from larvae found full grown near Glastonbury at end of June and *Gonoptera libatrix*, L. (emerged 17th July), from a larva found at the same time and place. Two moths of the latter species were taken on the same day that the larva was found.

Mr. D. G. Sevastopulo exhibited examples of the following species of *Pyralidae* taken at light in Calcutta. *Galleria mellonella*, L., *Ancylolomia chrysographella*, Koll., *Scirpophaga auriflua*, Zell., *S. gilviberbis*, Zell., *Schoenobius bipunctifer*, Wlkr., *S. adjurellus*, Wlkr., *S. incertellus*, Wlkr., *Cirrhochista brizoalis*, Wlkr., *Euzophera perticella*, Rag., *Hypsopygia mauritialis*, Bsd., *Pyralis manihotalis*, Guen., *Tamraca torridalis*, Led., *Herculia igniflua*, Wlkr., *H. suffusalis*, Wlkr., *Nymphula fluctuosalis*, Zell., *Oligostigma bilineale*, Snell., *Talanga sexpunctalis*, Moore, *Hymenoptychis sordida*, Zell., *Bradina admixtalis*, Wlkr., *Hydroybina bicolor*, Moore, *Pycnarmon caberalis*, Guen., *P. meritalis*, Wlkr., *Zinckenia perspectalis*, Hbn., *Z. fascialis*, Cr., *Eurrhyarodes tricoloralis*, Zell., *E. bracteolalis*, Zell., *Pagyda traducalis*, Zell., *Ercta elutalis*, Wlkr., *E. ornatalis*, Dup., *Cnaphalocrocis medinalis*, Guen., *Marasmia venilialis*, Wlkr., *Bocchoris acamasalis*, Wlkr., *Dichocrocis evavalis*, Wlkr., *Ceratarcha umbrosa*, Swinh., *Botyodes asialis*, Guen., *Sylepta derogata*, F., *S. lunalis*, Guen., *Lygropia quaternalis*, Zell., *Agathodes ostentalis*, Hbn., *Glyphodes laticostalis*, Guen., *G. negatalis*, Wlkr., *G. psittacalis*, Hbn., *G. hilaralis*, Wlkr., *G. marginata*, Hmps., *G. vertumnalis*, Guen., *G. unionalis*, Hbn., *G. stolalis*, Guen., *G. bivitralis*, Guen., *G. caesalis*, Wlkr., *G. canthusalis*, Wlkr., *G. pyloalis*, Wlkr., *G. bicolor*, Swains., *G. indica*, Saund., *Pygospila tyres*, Cr., *Euclasta defamatalis*, Wlkr., *Lepyrodes neptis*, Hbn., *Analyta sigulalis*, Guen., *Leucinodes orbonalis*, Guen., *L. apicalis*, Hmps., *Crocidolomia binotalis*, Zell., *Sameodes cancellalis*, Zell., *Terastria meticulousalis*, Guen., *Isocentris filialis*, Guen., *Maruca testulalis*, Geyer, *Tetridia caletoralis*, Wlkr., *Pachynoa sabelialis*, Guen., *Pachyzancla licarsisalis*, Wlkr., *Antigastra catalaunalis*, Dup., *Noorda blitealis*, Wlkr., *Pionea leucanalis*, Swinh.

Reports on the season were communicated from Torquay, Swanage, Dorset, Devon and Sussex.

29th JULY, 1933.

FIELD MEETING—BYFLEET.

Leader—Mr. C. N. HAWKINS, F.R.E.S.

Owing probably to a rather threatening weather outlook in the morning, and to the fact that a good many members were away on

holiday, the attendance was disappointingly small, in spite of the fact that the meeting was arranged for both morning and afternoon parties so as to cater for everyone, only 4 Members and 1 Visitor, in addition to the Leader, put in an appearance.

In the morning the route followed was along the canal bank and over the adjoining marsh towards Weybridge while in the afternoon, after picking up the two Members who formed the afternoon party, the direction taken was towards Woking. The comparatively short time available did not allow of any great distance being covered in either direction, and presumably on account of the early season, insect life seemed to be scarce, particularly on the vegetation along the Canal bank. It is just possible the scarcity in the latter case might have been due to the plants having been very recently swept by the towing rope of some barge. Apart from the fact that the Leader had the good fortune to find a nearly full-fed larva of *Acrionicta alni*, L., on birch at the place where the morning party sat down to lunch, no very special captures were reported, but the following may be noted :—

*Pterostoma palpina*, L. (1 larva), *Pygaera curtula*, L. (a fair number of small larvae on Aspen), *Dasychira pudibunda*, L. (small larvae), *Lithosia deplana*, Esp. (a worn imago), *Nonagria geminipuncta*, Haw. (pupae), *Anarta myrtilli*, L. (larvae and 1 imago), *Calothysanis amata*, L. (♀ imago), *Euchoeca nebulata*, Scop. (larvae), *Bapta temerata*, Schiff. (larvae), *Boarmia punctinalis*, Scop. (larvae). A fine, very well marked, imago of *Catocala nupta*, L., was noted at rest on a shed and most of the commoner Butterflies appropriate to the locality were seen. Although a certain amount of building is going on near Byfleet Station and that electric pylons carrying electric cables have been erected near the Canal, cutting through some of the woodland, there still remains a large area of very attractive looking ground which might well repay careful working.

10th AUGUST, 1933.

The PRESIDENT in the Chair.

The President exhibited the larva of *Dicranura furcula*, L., and gave a short account of his recent collecting experiences in Sussex and Kent.

He had found *Polyommatus icarus*, Rott., everywhere abundant; *Pyrameis cardui*, L., was locally common; *Colias hyale*, L., had

appeared in Kent in fair numbers : he had not seen *C. croceus*, Fourc., yet ; *Aglais urticae*, L., and *Vanessa io*, L., were generally abundant ; *Rumicia phlaeas*, L., were here and there ; *Agriades thetis*, Esp., was locally fairly common ; and moths were in great numbers.

Several members had also met with *P. icarus*, *A. urticae*, *P. cardui*, *V. io*, etc., in their gardens.

Mr. Turner exhibited two rare species of Cactus from Lower California collected this spring and just received. *Cereus eruca*, Brand., known as the "Creeping Devil," from the Pacific shore sandy area winding hither and thither like a huge caterpillar, creeping from the growing tip, dying in the rear and rooting from the underside. The other somewhat resembled a green vegetable marrow angulated and irregularly humped ; it was evidently a monstrous growth and as yet the species was undetermined.

Mr. Eagles exhibited the larvae of *Pygaera curtula*, L. on aspen, and of *Notodonta ziczae*, L., both taken at the Byfleet Field Meeting, with larvae of *Palimpsestis octogesima*, Hb., from Enfield.

He also showed the Coleoptera *Leptura (Strangalia) quadrifasciata*, L., Byfleet Field Meeting ; *L. fulva*, Benfleet Field Meeting ; and *Niptus hololeucus*, Fald., from Enfield.

Dr. King exhibited the larvae of *Lithosia sororcula*, Hufn., feeding on the green alga on beech from the Chiltern Hills, Bucks., also larvae of *Lophopteryx cuculla*, Esp., and of *Demas coryli*, L., both on maple.

Mr. O'Farrell exhibited a green form of the larva of *Eumorpha elpenor*, L., from Alfriston, Sussex.

SPIDER ATTACKING MOTH.—Mr. Robert Adkin exhibited a specimen of the Tineid moth *Cerostoma vittella*, L., and read the following note :—

"At about 10 a.m. on 25th June last I was passing an elm tree in one of the roads near my house in Eastbourne when a slight movement on the bark of the tree attracted my attention, and on closer inspection I found that it was a *C. vittella* convulsively jerking its wings at intervals of a few seconds, a very unusual proceeding in a species that generally rests tightly pressed to the tree during the day. As I boxed the moth a tiny spider sprang from it to a distance of several inches and hid itself so securely in some crevice that I was unable to find it ; it was a small black and white creature, I should estimate about one fourth the size of the moth's body and probably a *Salticus* sp. one of the hunting spiders. The moth was alive when I boxed it but on looking at it some ten

minutes later it appeared to be quite dead, presumably the result of the spider's attack."

Mr. Adkin also exhibited a specimen of the Tortrix moth *Argyro-ploce corticana*, Hb. (*picana*, Fröl.) as to which he said:—I was wandering in Bagley Wood, Oxford, on the afternoon of 2nd July, seeking what I might find on the undergrowth, when a little moth flashed past me and settled on the stem of a silver birch tree little more than a yard away. I noted the exact spot on which it alighted but so well did its colour and pattern assimilate with its surroundings that I failed to see it until it slightly shifted its position: its movement, although a mere settling down more securely, just gave me the clue to its whereabouts; without it I doubt if I should have been able to find it.

Dr. K. G. Blair exhibited a box of insects taken on the occasion of the Field Meeting at Benfleet, including the following:—

ORTHOPTERA.—*Metrioptera roeselii*, Hag., including a ♀ example of the macropterous form *diluta*, Charp. This appears to be only the second British record of this form (see Lucas in "Entom." 1923, p. 106). The previous example, also ♀, was from Clacton.\* *Conocephalus dorsalis*, Latr., an early date for this species. *Phasgonura viridissima*, L.

ODONATA.—*Lestes dryas*, Kby., a local British species. Lucas cites a ♀ taken at Leigh in 1891. It was not uncommon among the reeds, together with *Ischnura elegans*, Lind. Its bright blue eyes were a noticeable feature in flight.

TRICHOPTERA.—*Grammotaulius nitidus*, Müll., also rare in Britain.

COLEOPTERA.—From the dyke: *Dyschirius luedersi*, Wagn., only recently recognised in Britain, hitherto confused with *D. aeneus*, Dej. ("E.M.M." July, 1933), and *D. salinus*, Scop., in company with *Bledius spectabilis*, Kr., *Coccidula scutellaris*, Hbst., and *Heterocerus obsoletus*, Curt. From the mud banks on the saltings: *Heterocerus flexuosus*, Steph., *H. maritimus*, Guér., *Trogophloeus foreolatus*, Sahlb., and *T. halophilus*, Kies. From Mallow: *Apion malvae*, F., *A. rufirostre*, F., *A. radiolus*, Kby., *A. aeneum*, F., and *Podagrica fuscicornis*, L. From Yarrow flowers: *Leptura livida*, F. (plentiful).

Mr. S. N. A. Jacobs exhibited:—1. Seventeen species of Pyralidina from Calcutta taken by Mr. D. Sevastopulo at light.

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\* He referred to a recent statement that in such cases of macropterous forms of normally brachypterous species the reproductive organs in either sex were abortive.

2. *Aphomia gularis*, Zell.—Seven male and four female specimens of this hitherto rare species, and also a cocoon. These specimens were taken in a dried fruit warehouse, and are considered to have come out of Spanish Almonds, although there was also a goodly store of walnuts and ground nuts from various places, including China, South Africa, and South America as well as the Mediterranean coasts whence came walnuts and dates.

A pair was taken *in cōp.* and eggs were secured on the 2nd August. These were horizontal-ovate, lightly reticulated, and of a pale greyish white colour. Unfortunately the eggs hatched before they had been photographed, and produced larvae on the 7th, thus having spent but five days as ova.

The pair found *in cōp.* were on the ceiling of the store, the female lying along the ceiling with wings closely folded about the body, while the male hung at right angles to the female, with the wings partly extended, quite breaking any regular outline, and giving the impression of a loose flake of plaster.

The young larvae were about an eighth of an inch in length and exceedingly active. They were of a pinkish-yellow colour with head and plates of a rather dark amber colour. They appear to feed under a web of silk, food particles, and frass, and have all retired to the underside of the fragments of almond, with which they have been supplied, and which they have secured to the bottom of the tin with their webs.

3. *Myelois phoenicis*, Drnt.—This species is exceedingly rare, and only the type specimen exists in the cabinets at South Kensington, but altogether six specimens have come to hand this year, four of which have already been passed to the Natural History Museum, and one is being retained in the hope of eggs. The other specimen is exhibited herewith.

The insect feeds in Algerian and Tunisian dates, the Museum specimen having come from Basra, and the specimens taken this year came from a saleroom where Tunisian dates were stored. The fancy packings are preferred to the pressed dates, although the pressed dates are sometimes affected.

4. *Myelois ceratoniae*, Zell.—This species also affects dates and comes from the Mediterranean coasts and also South Africa.

Romanoff "Memoires" (Vol. 7, p. 57) describes the species as feeding on *Ceratonia siliqua* (Caroub bean) *Robinia pseudacacia* (Locust bean), also dried dates, quinces, and chestnuts.

The larva is described as rose-carmine when young, fading through

pink to yellowish when full grown and is found in summer feeding on the hard seeds of locust beans. It pupates in a fusiform cocoon of white silk mixed with excrement, without leaving the pod, the moth emerging in August to the end of September, but some larvae hibernate and emerge the following spring.

Possibly, owing to the mildness of the last winter, these hibernating larvae were enabled to pass the winter in this country and have accounted for the earliest specimens, while their progeny and (or) new arrivals in fresh supplies of dates are responsible for the August insects.

Meyrick describes this insect as being scarce and local. The Natural History Museum series contains several specimens marked "England," but with no closer indication of their source.

Mr. C. N. Hawkins read the Report of the Field Meeting held at Byfleet on 29th July.

19th AUGUST, 1933.

FIELD MEETING.—EYNSFORD.

Leader—K. G. BLAIR, D.Sc., F.R.E.S.

Present: 8 members and 5 visitors. We were again fortunate with the weather though there was but little sun, and a light shower shortly after the arrival of the afternoon party was not enough to interfere seriously with collecting. An unusual diversion was provided by a grass-fire close to the railway, but this was successfully tackled by the afternoon party before it had assumed serious proportions.

The route taken was for about a mile along the Sevenoaks road, when, crossing the railway by the second bridge, the morning was spent on the rough ground between here and the wood known as 'The Birches.' Owing to a slight confusion between the 'rifle range' and the 'gun-testing range' the morning party after lunch proceeded to the former while the afternoon party worked across the ridge into the next valley, and to them fell many of the better captures. Collecting was mainly devoted to beating, some 30 species of lepidopterous larvae being secured. Insects at rest or on the wing, except for a few common butterflies, were scarce, but *Limenitis sibilla*, L., and *Pyrameis atalanta*, L. were seen; *Psilura monacha*, L., a nicely banded specimen was taken at rest on a larch

trunk: *Anaitis plagiata*, L. and (or) *efformata*, Gn., were fairly plentiful and *Hydroecia nictitans*, Borkh., *Acidalia ornata*, Scop., *Chiasmia clathrata*, L., *Dysstroma truncata*, Hufn., a rather nicely banded example of *Euphyia bilineata*, L., *Pyrausta purpuralis*, L., *Nomophila noctuella*, Schiff., and *Crambus geniculens*, Haw. were noted.

Of larvae the following were among those taken:—*Notodonta dromedarius*, L., *Lophopteryx cuculla*, Esp., and *L. camelina*, L., *Eutricha quercifolia*, L., *Drepana cultraria*, Fab., and *D. lacertinaria*, L., *Cilix glaucata*, Scop., *Nola cucullatella*, L., *Hylophila prasinana*, L., *Demas coryli*, L., *Acrionicta leporina*, L., *A. tridens*, Schiff., *Dianthoecia capsicola*, Hb., *Euclidia mi*, Clk., *Hipparchus papilionaria*, L., *Bapta bimaculata*, Fab. (*taminata*, Schiff.), *Boarmia roboraria*, Schiff., and various pugs.

Coleoptera were very poor, being represented by seven species of ladybirds and about as many others. Of the Hemiptera *Acanthosoma haemorrhoidale*, L., both young and mature, was freely beaten, while *Troilus luridus*, F., *Nabis lativentris*, Boh., and *Macropsis lanio*, L., were less numerous. Several examples of the long-horned Grasshoppers *Mecomema thalassinum*, Deg., and *Leptophyes punctatissima*, Bosc., were also taken. The apterous Earwig, *Apterygida albipennis*, Meg., was a capture of note, and var. *forcipata*, Steph., of the common species was also observed.

24th AUGUST, 1933.

#### The PRESIDENT in the Chair.

The President had recently spent a few days in the Norfolk Broads and he reported the following:—There was a good 2nd flight of *Papilio machaon*, L.; the larvae of *Orgyia gonostigma*, Fab., were found on sallow and full fed larvae of *Acrionicta leporina*, L., on alder; the larvae of *Pigaera pigra*, Hufn., were common; *Nonagrja cannae*, Ochs., was nearly over; night work was not good compared with last year.

Mr. Jacobs exhibited larvae which he presumed to be those of *Aphomia gularis*, Zell.

Mr. D. G. Sevastopulo exhibited *Chilasa (Papilio) clytia*, L., form *clytia*, and also form *dissimilis*, L., with mature and immature larvae and pupae; the Hypsid *Ajanais sicus*, Fab., with a larva; and the Noctuids *Ophiusa coroneta*, Fab., and *Polytela gloriosa*, Fab., with their larvae. All Indian Lepidoptera.

Mr. S. Wakely exhibited : (a) Specimens of *Coleophora onosmella*, Brahm., with the larval cases; (b) a series of *Douglasia ocerostomella*, Stt., with stems of *Echium vulgare*, L., showing the empty pupa cases protruding; both species being taken at Selsdon, Surrey, on *Echium vulgare*.

Mr. Bliss exhibited living larvae of *Calocalpe (Eucosmia) undulata*, L., of *Plagadis dolabraria*, L., and of *Gonodontis bidentata*, Clk.

Dr. E. A. Cockayne exhibited a series to show the variation in the larvae of *Moma alpium*, Osbeck. (*orion*, Esp.), including the two forms figured by Buckler, (1) with yellow lozenge on abdominal somites 1, 3, 6; (2) with yellow lozenge on somites 1, 2, 3, 4, 5, 6; (3) intermediates with yellow lozenge on 1, 3, 6, and in addition a lozenge partly red and partly yellow on somite 4 in one case, on 5 in another, and on 4, 5 in a third; (4) with lozenges yellow on 1, 2, 3, 5, 6, and partly red and partly yellow on somite 4; (5) also a larva without a yellow lozenge on somite 6.

Dr. Blair exhibited the insects taken by him on the occasion of the Field Meeting at Eynsford on 19th August.

Dr. Bull exhibited a series of *Brenthis selene*, Schiff., bred in July and August; they were small but otherwise quite normal; also an *Epinephela tithonus*, L., with areas missing from the margins of all four wings. It had evidently been attacked when in the resting position.

Mr. Robert Adkin exhibited series of some of the *Hyponomeuta* spp. together with their pupal cocoons and read the following note.—

From time to time I have exhibited and remarked upon several of the species of the genus *Hyponomeuta*, and now through the kindness of Mr. J. C. F. Fryer I am able to add yet another, viz., *H. vigintipunctata*, Reiz. It is a local species, its range being governed by its food-plant, *Sedum telephium*, L., and Mr. Fryer having found that the plant was fairly common in his neighbourhood, was not long in discovering the larva also and very kindly sent me a "nest" of pupae from which quite a nice lot of moths emerged.

I am also exhibiting with them series of *H. padellus*, L., *H. malinellus*, Zell., and *H. cognatellus*, Hb., and with each their pupal cocoons. With regard to the perfect insects it will be noted that *H. vigintipunctata*, and *H. padellus* (which were reared from black-thorn larvae) are much alike, both being distinctly leaden-grey in colour with small black dots, but the former may easily be separated by a small black dot in the fringe just below the apex of the wing and by its grey head, whereas in *padellus* the head is white even in the

darkest specimens; thus we get a pair of insects very much alike, but which by reason of certain constant markings are not difficult to separate.

The other pair of species that I am showing is perhaps even less easy to separate, but whereas *H. cognatellus* has pure white fringes to its forewings, *H. malinellus* always has a greyish tinge which is most pronounced on the underside. *H. cognatellus* also is, on the average considerably the larger, but unfortunately this latter distinction does not always hold good for occasionally one finds a specimen no larger than an exceptionally fine *H. malinellus*.

In regard to the pupal cocoons, it will be noticed that both *H. vigintipunctata* and *H. padellus* spin rather flimsy grey cocoons within the larval web and that they are placed in no particular order but just scattered about anyhow; whereas, both *H. cognatellus* and *H. malinellus* spin tough white cocoons, placed side by side in a most orderly fashion and usually in a very slight web constructed for the purpose.

I have on former occasions ("Proc." 1927-8, p. 48. "Proc. Ent. Soc." 1928, p. 13. "Entom." 1930, p. 101) given my reasons for regarding *H. malinellus* as distinct from *H. padellus* and the more I learn of the habits of the species included in the genus *Hyponomeuta* the more does it appear to me that they fall into two groups, but I am not yet sure whether this would apply to the whole of the species, if it does I should place *H. padellus* and *H. vigintipunctata* in one and *H. malinellus* and *H. cognatellus* in the other.

Dr. Blair reported that he had just bred a *Euchloris smaragdaria*, Fab., from larvae taken on the Benfleet Field Meeting; other larvae taken on the same occasion were still small and would hibernate in the normal manner.

Mr. Hutchings reported the occurrence of *Colias hyale*, L., in Norbury Park, Surrey.

9th SEPTEMBER, 1933.

FIELD MEETING—WESTERHAM.

Leader.—Mr. S. N. A. JACOBS.

Three members met at Westerham at 11.30 on a fine summer day, and they turned towards Limpsfield Chart for beating operations. This was one of the last days of an abnormally long dry period, and

in consequence beatable foliage was not too plentiful, but nevertheless the ground was thoroughly worked. Lunch was taken at 1 p.m. and the party was joined by a fourth member, but after a short period of work, a patch of smouldering turf burst into flame, and the party had a strenuous half hour of fire-fighting, finally, having subdued the actual outbreak, though compelled to leave the turf still smouldering, the party retired blackened but thirsty, to Pitt's Cottage for a good tea, and so home.

The usual larvae were taken, and the two notable facts were the commonness of larvae of *Demas coryli*, L., and imagines of *Rumiccia phlaeas*, L., the former appearing far more plentifully than has usually been the case in this locality, and the latter being positively abundant. There was also quite a strong third brood of *Polyommatus icarus*, Rott.

14th SEPTEMBER, 1933.

#### The PRESIDENT in the Chair.

Mr. S. Wakely exhibited a living larva of *Orthonama lignata*, Hb. (*pittata*, Borkh.), reared from ova laid by a female taken at Rookley, in the Isle of Wight, during August, and remarked that the larvae preferred dandelion leaves to bedstraw and clematis, which were also offered. Only the slightly withered leaves were eaten, fresh ones remaining untouched. Three imagines of this species were also shown from the locality mentioned. A report of the Field Meeting at Benfleet was read by Mr. Wakely, and specimens of the Lepidoptera taken on that occasion shown, including *Adopaea lineola*, Ochs., *Acidalia immutata*, L., *Cataclysta lemnata*, L., *Homoeosoma sinuella*, Fab., *Phalonia (Chrosis) tesserana*, Treits. (*alcella*, Schulz.), *Phthorimaea (Gelechia) obsoletella*, F.R., *Batrachedra praeangusta*, Haw., etc.

Mr. T. R. Eagles exhibited a larva of *Eutricha (Gastropacha) quercifolia*, L., beaten out at the Eynsford Field Meeting; larvae of *Ortholitha mucronata*, Scop. (*palumbaria*, Schiff.), reared from ova laid by a female taken at the Ashdown Field Meeting; and the local Coleopteron *Prionus coriarius*, L., from Enfield.

Mr. H. Moore read the following Note and exhibited the Butterflies to which it referred, including *Colias croceus*, Fourc., *Polygonia c-album*, L., *Pyrameis cardui*, L.

ABUNDANCE OF BUTTERFLIES IN SOUTHWARK PARK.—“For over

fifty years I have kept something of a record of the fauna of my native parish of Rotherhithe, of the Insects especially. This summer I have been helped by two young friends, who can hop over a railing and sprint from a Park-keeper, and catch butterflies by merely cupping their hands. They have added three to my list; one I think will interest you. To catch within two miles of here *Polygonia (Grapta) c-album*, L., seems hardly probable, and to state that *P. cardui*, L., was in numbers might reflect upon my veracity. *P. atalanta*, L., has been unusually abundant, and in July *V. io*, L., could not be called scarce. Two *Colias croceus* have been taken, one only good enough to prove the fact. Now and again we see *G. rhamni*, L. With the exception of the "Comma" the above mentioned may not be of general interest, but locally this summer is one to be remembered."

Mr. Moore then read the following note on a supposed Tipulid larva which he exhibited.

A few days ago my attention was called to a glistening streak about  $\frac{1}{16}$  in. broad across the carpet of a front room that immediately suggested a slug. Upon tracing it back it led to the foot of a flower stand containing a pot of aspidistra. Presumably it emerged from the surface of the soil in the pot, and then had fallen to the floor, but further search showed, there being no signs of slime on the outside of the pot, that it had fallen into the metal lined holder, for its passage was clearly visible around the bottom and clear of the saucer and then straight up one side, when it must either have let itself down by a thread of mucus or had a fall of nearly 3 feet, there being no sign of a climb down. It then made its way across the room towards the other window to the fringe of the hearth rug, then made an oval circuit, crossed its former track and came to rest about 8 inches beyond. A distance of over 150 inches. After searching carefully for the larval skin, it now appears to me, that the pupa is still inside it. From what I know of "leather-jackets" such an unusual procedure seems worth recording.

He also exhibited the "flesh fly," *Sarcophaga carnaria*, L., and read the following note.—"Within the last fortnight, a fly singed its wings in the gas, and fell on the dressing table. I boxed it for examination in the morning. Two days later it was dead. Then I saw what I took to be a parasitic larva on it, and put it aside after pinning to see what it might come to. Later in the day a dozen or more larvae emerged. Then I knew. The point of interest is, though the parent was dead, the progeny were born alive without Caesarean section."

Mr. Bliss exhibited the following Lepidopterous larvae—*Hemithea aestivaria*, Hb. (*strigata*, Müll., *thymiaria*, Schiff.) and *Euchloris smaragdaria*, Fab., from Benfleet, *Drepana cultraria*, Fab., *Demas coryli*, L., and *Lophopteryx camelina*, L., including the pink form, from Ashdown Forest.

Mr. E. J. Bunnet exhibited *Aphantopus hyperantus*, L., ab. *lanceolata*, Shipp., taken by Mr. G. J. Sard in Ashdown Forest, and the larvae of *Pyrausta aurata*, Scop., showing red and green forms, feeding on garden mint.

Dr. Bull exhibited a larva of *Ectropis crepuscularia*, Hb., and a pupa of *Pyrameis atalanta*, L., enveloped in leaves.

Mr. Niblett exhibited a Longicorn beetle picked up in Commercial Rd., E., subsequently identified as *Monochamus titillator*, Fab., a native of N. America.

Mr. T. H. Grosvenor mentioned that he had seen *Eugonia polychloros*, L., in Basinghall St., E.C.

Mr. Robert Adkin read the following Note on *Laspeyresia* (*Carpocapsa*) *pomonella*, L. (the Codling Moth).—*Laspeyresia pomonella* is an insect of such economic importance that any information regarding its habits may be worth noting. I therefore venture to put on record the following observations made during the past exceptionally warm summer.

From larvae collected during August, 1932, the first imago emerged on 16th June, 1933, which compares with first emergences of 14th July, 1926; 10th July, 1927; 7th July, 1928; 2nd July, 1929; 22nd June, 1930; but the next in that year was not until 1st July and the last on 30th July, so that in that year the whole emergence extended over a period of more than five weeks as against an average of about three weeks; 28th June, 1931, and 3rd July, 1932. The last emergence this year (1933) was on 8th July so that in spite of the early beginning the whole period of emergence hardly exceeded the average and was fairly evenly distributed during the whole of the time. Indeed the whole period of emergence this year appeared to be about a fortnight earlier than usual, but as the apple fruits also were well advanced the emergence of the moths coincided with the normal state of the fruit for the egg-laying by the moths.

Towards the end of July as no moths had appeared for some time I pulled apart the pieces of bark and wood containing the cocoons from which the moths had emerged, and was surprised to find among them four containing larvae that had not pupated. This

appears to suggest either that a proportion of the larvae do not pupate until late in the year and so produce a late emergence, or, as is more probable, that they pass a second winter in the larval stage. Unfortunately, in parting the bark the cocoons were torn, which it is to be feared will kill the larvae; they were, however, packed away again with as little delay as possible in the hope that they might survive and thus enable the question to be settled, but so far no moths have emerged from them. (See "Proc." 1931, p. 71.)

Between the 12th and 28th July I collected from the trees a number of apples that showed signs of containing larvae. (It is of little use collecting fallen fruit as by the time the apple falls the larva has usually left it). Several larvae were seen to come from these fruits and to spin up, but only one moth emerged, 15th August, the others will no doubt lie over the winter as larvae. A moth was captured on 12th August. It is, therefore, very certain that this year there was a second emergence, as appears usually to be the case in favourable seasons, even in this country. Indeed, had I commenced to collect infested fruits earlier I should no doubt have reared a larger second brood of moths, for on 12th July I found several fallen from which larvae had already escaped.

It has been asserted and oft repeated, that the moth lays its eggs in the eye of the fruit and only one egg in each. ("Ent. Mag." 1833, p. 144). On 3rd August I found an apple on one side of which was the burrow of a larva that had fed up and had already left to pupate, on the other side a young larva was feeding in a fresh burrow; neither of the burrows had any connection with the eye.

NOTE.—Since the above was written it has become very evident that there has been a very considerable second brood of larvae this year (1933). On 24th September a nearly full fed larva was found in a pear, and quite a large number of late store apples such as Sturmer-pippin were found to have the unmistakable signs of second brood larvae having fed in them.

In my experience the very early sorts of apples, such as Mr. Gladstone and Laxton's Advance, and the very late, are seldom attacked, but this year proved an exception in both cases, for although only a very few of the early sorts were found to contain larvae, nearly 35% of a good crop of Sturmers were damaged by them and apparently all of them of the second brood.

28th SEPTEMBER, 1933.

The PRESIDENT in the Chair.

Mr. Angus Frazer of Tankerton was elected a member.

Mr. H. J. Turner exhibited a box containing a large number of British Micro-lepidoptera presented to the Society for their collection by Mr. E. E. Green of Camberley.

Mr. S. N. A. Jacobs exhibited young larvae, full-fed larvae, purged larvae for hibernation, a cocoon mass, and imagines of *Aphomia gularis*, Zell., and communicated notes.

Mr. Robert Adkin exhibited series of the Tineid moths *Cerostoma xylostella*, L., and *Blastobasis lignea*, Walsm., both of which species had been taken fairly commonly in a light trap in his garden at Eastbourne during the past summer.

With regard to *B. lignea* he said that our fellow member, Mr. Mansbridge, had found the larvae feeding in damp leaf rubbish and bred the moths from them, and he had little doubt that the species was so breeding in his garden, but although he searched some likely spots he had so far failed to find it.

Mr. Priske exhibited a number of the shells of the very local Mollusc *Laciniaria* (*Clausilia*) *biplicata*, Montg., from one of its few old localities, Mortlake, and found at the base of willows and on the mossy banks of streams. For comparison he also showed the shells of the allied species *Clausilia rolfhii*, Leach., another very local and rare species from the S. of England; *C. rugosa*, Drapnd., a common species in all parts of Britain; and *Marpessa* (*C.*) *laminata*, Montg., associated with beech trees in many parts of the country. The species are remarkable for the elastic hinged aperculum, which closes the aperture of the shell in times of danger and in very hot or cold weather. It was noted that *C. biplicata* did not aestivate during the very hot periods of the present year.

Mr. Russell remarked that the *Clausilia* shell had been used in heraldic figures.

Mr. Eagles exhibited the larvae of *Ephyra orbicularia*, Hb., beaten from sallow near Swanage. They were much more numerous on the smaller bushes and were heavily parasitized.

Dr. G. V. Bull exhibited a short series of the 3rd emergence of *Rumicia* (*Heodes*) *phlaeas*, L., from Kent. One example had a striated border to the margin of the hindwing and several shades of ground colour were apparent. He recorded that he had observed *Pieris brassicae*, L., being attacked by a bird.

Mr. Frohawk exhibited examples of the 2nd brood of *Nisoniades tages*, L.; they were taken 13th August and were comparable in their cream coloration with those of the hot year of 1921.

Dr. Blair exhibited a living *Manduca atropos*, L., with the hope of hearing it "squeak," but unsuccessfully.

He then read a short paper "On the Prothoracic Glands of the Larvae of the *Drepanulidae* and *Notodontidae* (Lep.)." [see Trans.]

In the ensuing discussion Mr. Hawkins suggested that some of the organs discussed might be tactile, but Mr. Blair stated that there was no development of hairs to suggest that, neither did they appear to be used in a manner appropriate to such a function.

Among the various remarks on the season were the observation of the 2nd broods of *Leucania litoralis*, Curt., *Campaea margaritata*, L., and *Ptychopoda aversata*, L., by Mr. Eagles; 2nd broods of *Comibaena pustulata*, Hufn., *Ourapteryx sambucaria*, L., *Agrotis exclamationis*, L. and a 3rd brood of *A. puta*, Hb., by the President; the occurrence of both larvae and imagines of *Euchloris smaragdaria*, Fab., at the same time by Mr. Blair; the appearance of *Fraustria renustula*, Hb., in September by Mr. Russell; and the appearance of both *Colias croceus*, Fourc., and *C. hyale*, L., in the neighbourhood of Lympne.

Mr. Jacobs presented a short report of the Field Meeting at Westerham on September 9th.

12th OCTOBER, 1933.

The PRESIDENT in the Chair.

Mr. Eagles exhibited living larvae of *Agrotis ripae*, Hb., and two species of Coleoptera obtained while digging for these larvae, viz. *Brosicus cephalotes*, L., and *Aegialia arenaria*, Fab.

Dr. Bull reported a 3rd brood of *Pararge megera*, L., in W. Kent and also the occurrence of *Polygonia c-album*, L., there.

Dr. E. A. Cockayne exhibited a specimen of *Carterocephalus palaemon*, Pall., ♂, with pale areas much extended especially on the hindwings, Northamptonshire. Also a series of *Thera juniperata*, L., race *scotica*, White, from Ballater showing variation including melanochromism, and ab. *nigra*, a melanic form, from the North Downs.

Mr. S. Wakely exhibited a collection of Lepidoptera taken at various Field Meetings of the Society during the current season. There were 80 different species altogether, many being taken in larval form

and subsequently bred. Those worthy of special note were: *Adela cuprella*, Thunb. (Oxshott); *Erastria* (*Monodes*) *venustula*, Hb. (Brentwood); *Odezia atrata*, L., and *Cedestis gysseleniella*, Dup. (Broadwater Forest); *Calamia phragmitidis*, Hb., *Leptomeris immutata*, L., *Homoeosoma sinuella*, Fab. (Benfleet); and *Stenoptilia zophodactyla*, Dup. (*loewii*, Zell.) (bred from seed-heads of Red Centaury collected at Eynsford). Another box of insects all bred from a bunch of Sea Lavender (*Statice limonium*, L.), gathered the previous autumn at Benfleet, was exhibited. There were three species—*Agdistis bennetii*, Curt., *Goniodoma limoniella*, Stt., and *Ergatis* (*Aristotelia*) *brizella*, Treits., thirty specimens of the last being bred. The first specimen emerged on 17th April, and they continued to emerge till the beginning of June. Sea Thrift (*Statice armeria*, Mill.) has been more often noted as the foodplant of this species. A further exhibit was larvae of *Perizoma bifasciata* Haw. (*unifasciata*, Haw.) taken at Riddlesdown, feeding on the seedheads of *Bartsia odontites*, Huds. Larvae of this species were also taken at Eynsford.

Dr. Cockayne then read a Paper entitled, "A Naturalist in the Arctic," and illustrated his remarks with a large number of lantern slides made from his own photographs. (See Trans.).

In the Discussion which ensued Dr. Cockayne said that neither sallowing nor sugaring was carried on; the mosquitoes were as a rule most troublesome. In walks at night up to 2.30 a.m. he only met with 1 Noctuid and 2 Geometers. The nights from 6 p.m. till 2.30 a.m. were bright and sunny in the summer periods. *Vacciniina optilete*, Knoch. (a Lyeaenid) was common near *Vaccinium*. *Colias palaeno*, Btlr., was fairly common, but difficult to capture. No doubt larvae fed under the snow and many probably had a long hibernating period. He saw a pupa case at Murmansk which was presumably that of *Zygaena exulans*, Hoch.

Mr. C. G. M. de Worms and Mr. T. R. Eagles presented their Report of the Delegates to the Centenary Celebration Meetings of the Entomological Society of London in May last.

REPORT OF THE DELEGATES TO THE CELEBRATIONS OF THE  
CENTENARY OF THE ENTOMOLOGICAL SOCIETY OF LONDON.

3rd to 5th MAY, 1933.

Such a unique and historic occasion as the Centenary of the Foundation of one of the leading Entomological Societies in the World is a matter almost of national importance and the celebrations

in connection with the event had been looked forward to by entomologists in all parts of the globe. Preparations and arrangements had been made well in advance by a special Committee of the Entomological Society and the success which they achieved cannot be over-estimated.

A few days before the Celebrations began detailed programmes were circulated. These gave a list of the Delegates, comprising 130 representatives of 89 Societies, Institutions and Universities in Great Britain, together with 76 Delegates, representing 62 Institutions in 23 countries within the Empire or of Foreign Nations. On 1st May was published a most interesting and extremely good account giving the history of the Society since its Foundation. This work had been most ably compiled by Dr. S. A. Neave, the Hon. Secretary.

The Centenary Celebrations began on the afternoon of Wednesday, 3rd May, when a General Meeting was held in the Rooms of the Royal Geographical Society, Kensington Gore, by kind permission of the Council. Delegates, Fellows of the Society together with their friends and several specially invited distinguished visitors assembled in the Main Hall at 3 o'clock. There was a representative gathering of several hundred people.

Prof. E. B. Poulton, D.Sc., F.R.S., was in the Chair. The Meeting opened with the usual formal proceedings, at which the newly-elected Fellows were invited to sign their names in the Obligation Book on this momentous occasion. The President then read a message from His Majesty the King, communicated through the Secretary of State, that in honour of the Centenary, the additional title of "Royal" should be accorded to the Society. This announcement was received with great applause after which the President proposed a loyal message of appreciation and gratitude for this signal honour bestowed on the Society.

Prof. Poulton then gave a general Address of welcome to the Delegates, at the same time mentioning what a privilege it was to him to occupy the chair on so memorable a day and also recalling his early connections with the Society. The Hon. Secretary next announced that in order to recognise the great services which Prof. Poulton had rendered to Entomology and to the Society, the Council had decided to confer upon him the honour of Honorary Life-President.

The reply to the Address of Welcome was delivered by Sir Peter Chalmers Mitchell, F.R.S., Secretary of the Zoological Society, who emphasized the eminent work which the Entomological Society and

its Fellows had done during the past hundred years and also the importance of the study of Insect Life to the welfare of the Human Race. Prof. Lesne, of Paris, replied on behalf of the Foreign Delegates, recalling the Centenary Celebrations of the Entomological Society of France in 1932.

Dr. Neave then proceeded to call upon Delegates to present their Congratulatory Addresses which were handed to the President. The ceremony concluded with an expression of thanks to the Officers and Council of the Royal Geographical Society and the company then adjourned to another part of the building where ample refreshments were provided.

In the evening of 3rd May at 8.30 p.m. a Scientific Conversazione was held exclusively for Fellows and Delegates, at the Society's rooms, 41, Queen's Gate. The Exhibits which were both numerous, varied and interesting were well arranged and displayed under the capable guidance and supervision of Mr. Collenette. In the large Meeting room the chief exhibits included a specially constructed Light Trap for insects shown by Dr. C. B. Williams, of the Rothamsted Experimental Station, together with a machine for recording the changes in weight of a bee-hive. Dr. Williams also exhibited Maps indicating the Migration of the "Monarch" Butterfly in the U.S.A. and an apparatus for testing the toxicity of various chemicals to insects. Mr. H. M. Edelsten on behalf of the Committee for the Protection of British Insects showed a fine series of *Chrysophanus dispar*, Haw., f. *batarus* from Wood-Walton Fen, taken and bred from 1928 to 1932 and placed in the National Collection. Dr. W. H. Thorpe gave an exhibit of the life history of *Pantophthalmus tabaninus* and Mr. Main photographs of the metamorphoses of several insects. Messrs. Mansbridge and Maulik showed various structures of Hispine, Chrysomelid and other larvae, while Mr. B. Uvarov of the Imperial Institute of Entomology exhibited living specimens of the Desert and Migratory Locusts.

Other exhibits included:—Dr. K. Jordan, on behalf of the Zoological Museum at Tring, a specialised group of fleas, *Stephanocircus*, occurring in Australia and South America.

Dr. H. Scott, specimens of Insects associated with palms in the Seychelle Islands accompanied by photographs.

Dr. MacLagan, Quantitative Analysis of Climate in relation to insect epidemics.

Dr. A. F. Rosa, Protective Mimicry among Indian Butterflies and Polymorphism in the female of *Papilio memnon-agenor*, L.

Mr. Ray Palmer illustrated the transformation of the Dragon-fly with Photographs and Dr. E. A. Cockayne showed a series of Somatic Mosaics of *Abraxas grossulariata*, L.

On behalf of the Ministry of Agriculture, Plant Pathological Station at Harpenden, Mr. J. C. F. Fryer gave a diagrammatic representation of the annual prevalence of Insect pests in England during the past 15 years.

Mr. C. de Worms, a selection of British Lepidoptera. Mr. Bushby, Living Insects. Mr. H. Donisthorpe, British Myrmecophiles with their hosts and also two colonies of Ants.

Prof. E. B. Poulton, F.R.S., showed forms of Mimicry in certain Danaine butterflies, gynandromorphs of *Papilio dardanus*, Brown, and seasonal forms of two African butterflies. Mr. L. W. Newman, Aberrations of British Lepidoptera. Prof. Hale Carpenter, forms of *Pseudacraea eurytus*, L.

Messrs. Leeson and Gillett and Dr. Wigglesworth on behalf of the London School of Tropical Medicine gave a display of Insects of Medical importance, and on behalf of the Imperial Institute of Entomology, Farnham laboratory, Dr. Thompson and Messrs. Cameron, Garthside, Morris and Moss gave an illustration of the Biological Control of Insect and Plant Pests.

Dr. A. B. Page, Mr. Herford and Mrs. Richards of the Biological Field Station of the Imperial College of Science showed insect attacks on stored products and methods of controlling them.

Dr. H. Eltringham, F.R.S., exhibited microscopic preparations and drawings, etc., illustrating Scent-organs in Insects, laboratory appliances for the accurate drawing of wing outlines, examples of hand-painted lantern slides and of photomicrographs, including comparisons of ordinary and infra-red photography.

During the evening excellent refreshments were again provided and the company dispersed about midnight.

On Thursday, 4th May, at 11.30 a.m. a photograph of the Delegates was taken in front of the Natural History Museum, Cromwell Rd., and at 4 p.m. on the same day a Reception of the Delegates was given by the Trustees at the Natural History Museum. Delegates assembled in the New Whale Gallery around the walls of which were displayed many exhibits of entomological interest. These included some of the oldest insects and collections in the possession of the Museum, some dating back over a hundred years, together with a fine series of the earlier and rarest works on Entomology. There was also a very fine display of drawings and

paintings by Mr. Engel Terzi, illustrating with accurate detail a great variety of insects.

On behalf of the Trustees the Delegates were welcomed by the Earl of Crawford and Balcarres who in a very apt and witty speech disclosed his personal experiences in the entomological field and subsequently drew attention to the great advances and importance of the entomological work of to-day. Tea was provided in the Gallery and the Delegates then proceeded in motor buses to the Zoological Gardens, Regents Park, where they were received by Sir Peter Chalmers Mitchell. After a tour of the Gardens the Delegates assembled in the Fellows' Restaurant where Prof. E. B. Poulton took the Chair at Supper. Informal speeches were made after the meal and Delegates were then conducted around the Gardens and the Aquarium, which had been specially illuminated for the occasion. The company dispersed at 11 p.m.

On the morning of Friday, 5th May, an excursion for Delegates from Overseas was made to the Zoological Museum at Tring, Herts, by the courtesy of Lord Rothschild and subsequently to the Zoological Park at Whipsnade where luncheon was served.

The Celebration concluded on the evening of 5th May with a Reception to the Delegates and Fellows given by His Majesty's Government and held at Lancaster House, St. James's, at which Major the Right Hon. Walter Elliot, M.C., M.P., Minister of Agriculture, received the guests who numbered many hundreds. The assembly was made particularly picturesque by the scarlet robes and coloured hoods worn by Doctors and distinguished Foreign visitors with Academic attainments. The company made a tour of the galleries and then partook of refreshments in the Lower Gallery. The Reception ended about midnight and it made a very fitting conclusion to the Centenary Celebrations of which all who were present will always retain the most pleasant and vivid memories.

C. G. M. DE WORMS.

T. R. EAGLES.

*26th, OCTOBER, 1933.*

ANNUAL EXHIBITION AND CONVERSAZIONE.

The PRESIDENT in the Chair.

More than 200 members and friends met to view the large number of exhibits brought by some 60 exhibitors. The Society's

reference collections of all orders, to which valuable additions have been made recently, were on view. The exhibits duly labelled were displayed on tables and later in the evening light refreshments were arranged.

Mr. R. Adkin exhibited specimens representative of the species taken in his Light Trap during the present season at Eastbourne, among a large number of others, a series of the very local *Blastobasis lignea*, Wals., the 2nd and 3rd known British specimens of *Nepticula decentella*, H.-S., and a long series of *Epunda lichenea*, Hb.

Rev. E. B. Ashby, exhibited the Geometer, *Odezia tibiale*, Esp., a very local European and North Asiatic moth, a female specimen, caught by Dr. E. Scott, of Ashford, Kent, at Moubijärvi, Finland, on 4.vii.33; together with a dozen specimens of the Noctuid moth, "The Barred Sallow" *Ochria (Xanthia) aurago*, Fab., taken at Ivy Blossom, at Ashford, Kent, by Dr. E. Scott and himself, 20th to 23rd Sept., 1933.

Mr. R. W. Attwood exhibited a local collection of moths from South Benfleet, Essex, taken in 1931-1933. The exhibit included among other species *Eumorpha elpenor*, L., *Pygaera curtula*, L., *Palimpsestis or*, Fab., *P. duplaris*, L., *Dasychira pudibunda*, L., *Poecilocampa populi*, L., *Arctia villica*, L., *Cosmotriche potatoaria*, L., several species of *Agrotis*, *Noctua* with *Hydroecia micacea*, Esp., *Nonagria geminipuncta*, Haw., etc.

Mr. Blyth exhibited a specimen of *Melitaea varia*, M-Dür., from Nevache, Hautes Alpes, having normal R. wings but the L. wings of quite a different pattern.

Mr. G. A. Brett exhibited living larvae of *Hemerophila abruptaria*, Thunbg., feeding on privet, with set imagines of the two previous generations, the original parents being ♂ f. *fuscata*, Tutt, and ♀ normal.

Mr. P. M. Bright exhibited two large cabinet drawers of many beautiful and remarkable aberrations of British Rhopalocera.

Mr. A. A. W. Buckstone exhibited a ♂ *Colias hyale*, L., taken at Bookham in September, having forewings clouded yellow as in *C. croceus*, Fourc., typical ♂, and the hindwings normal *C. hyale*; also a series of bred and captured *Polygonia c-album*, L., of both broods from Sussex and Surrey in 1933.

Dr. G. V. Bull exhibited striated forms of *Polyommatus icarus*, Rott., from Lympne, September, 1933, and of *Agriades coridon*, Poda, from Royston, 1924; also a series of *Aplecta occulta*, L., from

Rannoch, June, 1933, and an asymmetrical *P. c-album*, L., bred in September, 1933.

Mr. R. C. R. Crewdson exhibited a large number of species taken in various parts of Gt. Britain during the present year, including *Acrionicta myricae*, Gn., *A. menyanthidis*, View., *Mamestra glauca*, Hb., *M. contigua*, Vill., *Plusia interrogationis*, L., *Hadena rectilinea*, Esp., *Anarta melanopa*, Thunbg., *Thamnomoma brunnea*, Thunbg., *Entephria caesiata*, Schiff., etc., from Rannoch; *Pachnobia leucographa*, Hb., *Lobophora polycommata*, etc., from Grange, Lancashire; *Agrotis cinerea*, Hb., from Shoreham, Kent; *Colias hyale*, L., *Leucania albipuncta*, Fab., etc., from Kent; with species from Caernarvon, Sussex, Rossshire, etc.

Mr. H. M. Edelsten exhibited melanic and banded forms of *Amphipyra pyramidea*, L., from mid-Sussex. *Zygaena lonicerae*, Esp., two with 6 spots from Wood Walton Fen. *Comibaena* (*Phorodesma*) *pustulata*, Hufn., a curious creamy-pink form from mid-Sussex. *Crambus falsellus*, Schiff., bred from Cambridgeshire larvae. *Cosymbia* (*Ephyra*) *pendularia*, Clk., with a rosy band through upper and lower wings from mid-Sussex. *Ochyria* (*Coremia*) *designata*, Hufn., an asymmetrical specimen. The band on the left upper wing narrower than that on the right wing; from mid-Sussex. *Agriades coridon*, Poda, the progeny of a very blue female, from the Sussex Downs. *Amathes* (*Xanthia*) *circellaris*, Hufn., a dwarf form from mid-Sussex. *Zygaena lonicerae*, Esp., and parasite *Phryxe vulgaris*, Fall., which had emerged from the living moth, from Wood Walton Fen. The parasite *Picromerus bidens*, L., and larvae of *Phalera bucephala* L., which they were sucking, from mid-Sussex.

Mr. A. F. O'Farrell exhibited specimens of *Manduca atropos*, L., taken in the dairy of a farm near St. Keverne (South Cornwall) on 30th September, 1933, and of *Leucania vitellina*, Hb., taken in the same district on 19th September, 1933, at grass flowers. A series of *Polygonia c-album*, L., from Surrey (Effingham district) including a specimen with asymmetrical markings, and var. *hutchinsoni*, Robs., (New Forest), for comparison; a specimen of *Rumiccia phlaeas*, L., with the band on the hindwing replaced by streaks, with normal form for comparison; the pale undersized race of *Saturnia paronia* L., from south Cornwall, with normal forms from Surrey for comparison; a thinly scaled and nearly spotless *Spilosoma lubricipeda*, L., with normal form for comparison (Wimbledon).

Mr. L. T. Ford exhibited an addition to the British List of Micro-Lepidoptera, *Gracillaria pyrenaella*, Chrét.

Mr. C. N. Hawkins exhibited imagines, larvae and cocoon of *Parascotia fuliginaria*, L., from Surrey, 1933; also a number of aberrations of British Lepidoptera.

Mr. H. A. Leeds exhibited 141 aberrations showing the main result of examination of 23 species, in the wild, during 1933, among them were the following:—1. *Pyrameis cardui*, L., ♀ upperside, right wings partly bleached. 2. *Melanargia galathea*, L., ♀ underside, right hindwing devoid of ocellated markings, but their place partially taken by blackish streaks. 3. *Pieris napi*, L., ♀ upperside forewings, the black spots and streak united. And many other minor aberrations.

He also exhibited all 5 species of British "Hairstreaks" which had been captured or had emerged in Hunts on one day, viz., 16th June, 1933.

Mr. H. C. Huggins exhibited a number of rare species and aberrations of Pyralids, Phycitids, Crambids and Tortrices.

Mr. F. W. J. Jackson exhibited various degrees of ab. *obsoleta* of *Agriades coridon*, Poda, and other aberrations; also *Colias croceus*, Fourc., ab. *helice*, Hb., taken in the Isle of Wight in 1932 and 1933.

Mr. S. N. A. Jacobs exhibited imagines and living material of the dried-fruit pest, *Aphomia gularis*, Zell., now being found in numbers in the City warehouses.

Dr. Norman Joy exhibited many species of Lepidoptera including forms of *Papilio dardanus*, Brown; also skins of the Arctic and Common Terns.

Dr. Harold King exhibited a case of Dorset Lepidoptera.

Mr. C. G. Lipscombe exhibited *Brenthis selene*, Schiff., a very pale form and a dark suffused form; *Aphantopus hyperantus*, L., ♂♂, of the form *lanceolata*, Shipp.; a *striata*, Tutt, form of *P. icarus*, Rott.; and *Coenonympha pamphilus* of a very pale cream white colour and also a very dark specimen, etc., all from the Aldershot area.

Rev. J. N. Marcon exhibited a large number of aberrations of British Rhopalocera of which the more striking were a rayed ♂ of *Brenthis selene*, Schiff., Chiddingfold; a rayed *Melitaea cinxia*, L., from Swanage; an *Agriades thetis*, Esp., of an extreme *digitata*, Courv., form, another with white underside and another ab. *obsoleta*, Tutt, with white underside; *Rumicia phlaeas*, L., forms showing extreme development of pear-shaped markings, another with the upperside mostly black, two ab. *schmidtii*, Gerh., and one of the very rare ab. *alba*, Tutt. He also showed three yellow aberrations of *Zygaena trifolii*, Esp., from the Cotswolds.

Mr. W. F. Mellows exhibited aberrations of *Arctia caja*, L.

Mr. H. Moore exhibited a case of Butterflies obtained within the Rotherhithe district of S. London, not far removed from London Bridge.

Mr. A. Morley exhibited the following aberrations of Lepidoptera from the Folkestone district obtained during 1932 and 1933, including *C. pamphilus* ab. *minor* (22mm.); *A. coridon* ab. *corydonis*, *A. thetis*, Esp. (*bellargus*, Rott.), ab. *minor* (21mm.), also ab. *pallida* and several partially ab. *obsoleta*, two ab. *discoidalis-nulla*, and ab. *crassipuncta*, etc.; *Senta maritima* ab. *nigrocincta*, which species has not hitherto been recorded from Romney Marsh; *Metachrostis perla* ab. *flavescens*; *Hadena pisi* ab. *pallida* which is very rare in Gt. Britain (Tutt); *Xylophasia monoglypha*, a variegated *infuscata*, *Amathes lychnidis*, Hb. (*pistacina*, Fab.) ab. *canaria*, Esp., not previously recorded from Britain; *Operophtera fagata*, Scharf. (*boreata*, Hb.), ab. *fasciata*, etc.

Mr. W. G. Nash exhibited *A. hyperantus*, L., ab. *lanceolata*, Shipp., from the New Forest, etc.

Mr. L. W. Newman exhibited a large number of aberrations of British Lepidoptera obtained by him during the season.

Mr. F. Pennington exhibited *Leucania L-album*, L., from Cornwall, September, 1933, and various aberrations of Lepidoptera.

Mr. C. G. Priest exhibited bred and captured Lepidoptera from the Isle of Wight.

Mr. Quibell exhibited *Pyrameis atalanta* ♀ with pale buff bands, interrupted with white on the forewings; *Gonepteryx rhamni* well margined with pale red along the outer two-thirds of costa of the forewings and the tips of the hindwing-tails also red; several radiate forms of *R. phlaeas*, etc.

Mr. S. G. Castle-Russell exhibited some remarkable aberrations of British Lepidoptera bred or taken by him during 1933, including a beautiful *Brenthis euphrosyne* with much intensified and radiated black markings on the forewings, and hindwings largely covered by deep black with seven radiating bars of fulvous, the undersides being very light yellow with intensified and extended silver markings; an extreme radiated type of *B. selene* on both upper and undersides; other notable forms of the above two species, all taken near Chiddingfold, Surrey; *Euchloë cardamines* with very pale lemon patches instead of the usual orange tips, bred from a Yorkshire larva; *A. coridon* ♀, underside left wing normal, right wing very heavily striated, from Winchester; *A. thetis*, Esp. (*bellargus*,

Rott.), ab. *pallida*, Aust.; *Polyommatus icarus* with lower wings of a pale opalescent mauve shade; etc. from various other localities.

Mr. A. G. B. Russell exhibited a collection of Dorset rarities taken this year and last, including *Leucania unipuncta*, Haw., *L. albipuncta*, Fb., and *L. vitellina*, Hb.; a coloured drawing of aberrations of *Aglais urticae*, L., by F. W. Frohawk and another of *Lycaena arion*, L., by the same.

Dr. E. Scott exhibited *Parnassius apollo*, L., race *carelius*, Bryk., and *Pararge maera*, L., the northern race, both from Finland; and a series of forms of *Rumicia phlaeas* from Ashford, Kent.

Mr. A. Simmonds exhibited fine series of Rhopalocera taken recently in Austria.

Mr. Hy. J. Turner exhibited examples of *Dianthoecia barrettii*, Dbl., from Cornwall and Ireland with ab. *ficklini*, Tutt, and also the closely allied species *D. luteago*, Schiff., from the continent, with which it has erroneously been associated.

On behalf of Mr. A. J. Wightman, he exhibited a frame containing the wings of reputed *D. luteago* from specimens taken in Germany, Corsica, Amasia (*argillacea*, Hb., form), Digne (*argillacea* form), with notes on the ancillary appendages, showing that the *argillacea* form both from Amasia and Digne were a *barrettii* form and not a *luteago* form, having the short broad spine and not the long spine as in *luteago*.

Mr. S. Wakely exhibited Lepidoptera he had taken or bred during the present year, including *Anaitis eformata*, Gn., and *Coleophora onosmella*, Brhm., from Selsdon; *Aventia flexula*, a varied series of *Lithosia deplana*, Esp., (*helvola*, Hb.,) and *Peronea cristana*, F., from Box Hill; *Strymon pruni*, L., and *Ruralis betulae*, L., from Monk's Wood; *Catocala promissa*, Esp., *Cepphis advenaria*, Hb., and *Microstega pandalis*, Hb., from the New Forest; a large number of species from the Isle of Wight including *Colias croceus* with f. *helice*; together with many species taken at the Society's Field Meetings of the year, of which *Cedestis gysselella*, Dup. was the most notable.

Mr. H. G. Wells exhibited aberrations of *Polygonia c-album*, *P. icarus* ab. *striata* and others.

Mr. Clifford Wells exhibited various forms of British Lepidoptera.

The Rev. G. Wheeler exhibited a ♂ and ♀ of each of the broods of *Pieris brassicae*, showing how greatly the 3rd (unusual, October) generation, with its greenish un.s.b.w., differs from the two normal broods. Also *Polyommatus amandus*, Schn., from Finland including

a ♀ much suffused with blue; *Brenthis selene* with a clay-coloured ab. of the ♀ and a very small form of the ♂ (ab. *selenia*, Frr.); *B. aphirape*, Hb., trans. to race *ossianus*, Hbst., *Hesperia alveus*, Hb., and ab. *serratulaeformis*, all being from Finland. And series of *Brenthis arsilache*, Esp. from N. Germany, S. Germany, Belgium, the Engadine, Central Norway and S. Finland.

Dr. Harold B. Williams exhibited *Heliothis armigera*, Hb. from Folkestone; 3rd brood of *Lycaenopsis argiolus*; *Hipparchia semele* ab. *anopenopterus*, Lmbr., entirely without eyespots, Hampshire, 1933: yellow ♂ and brown ♀ of *Cosmotriche potatoaria* from N.E. Surrey; *Agriades coridon* ab. *fowleri*, South, and other forms from Folkestone.

Mr. H. Worsley Wood exhibited aberrations of *Mimas tiliae* and *Arctia caja*, L.

Mr. C. M. G. de Worms exhibited a large number of his captures and the results of his breeding during the past season including *Colias hyale*, L., from Kent; *Hyloicus pinastri*, L., taken and bred Dorset; *Stauropus faqi*, L., New Forest; *Agrotis vestigialis*, Rott., Studland; *Nonagria sparganii*, Esp., Kent; Lepidoptera taken at Aviemore and Struan including *Endromis versicolora*, Stdgr., *Aplecta tincta*, Brhm., Taeniocampid species, and *Nyssia lapponaria*, Bdv.; and a series of rarities, local species and aberrations including *Apatura iris*, L., *Melitaea athalia*, Hb., *Lophopteryx carmelita*, Esp., *Aeronicta auricoma*, Fb., *Leucania albipuncta*, L., *Heliothis peltigera*, Schiff., bred from Kent, *Mellinia ocellaris*, Bork., two taken in Suffolk, *Apocheima hispidaria*, Schiff., a melanic ♂, and a melanic ♀ of *Lycia hirtaria*, Clrek., from London.

Mr. N. G. Wykes exhibited aberrations of *Agriades coridon*, *Amorpha populi*, L., and forms of *Triphaena fimbria*, L. Framed coloured figures of various Lepidoptera including *Morpho menelaus*, L., *Papilio blumei*, Bdv., *Apatura iris*, L., *Ornithoptera poseidon*, Dbldy., etc.

On behalf of Mr. G. Wynn a specimen of *F. cardamines* with the apical areas lemon-coloured was shown. It was taken at Buxted on June 10th.

Mr. S. R. Ashby exhibited British *Carabidae*, *Chrysomelidae* and *Lariidae* (*Bruchidae*) from his collection of Coleoptera.

Dr. K. G. Blair exhibited (1) Various Coleopterous larvae; (2) Living larvae of *Tiresias serra*; (3) The 4 species of the Longicorn genus *Monochamus* which occur occasionally in Britain, viz., *M. quadrimaculatus*, *M. sartor*, F., *M. sutor*, L., and *M. galloprovincialis*; (4) and his captures in various orders at the 1933 Field Meetings.

Miss Winifred M. A. Brook exhibited numerous coloured sketches of British Fungi.

Mr. H. G. Denvil exhibited a living specimen of the four-lined snake (*Coluber quatuor-lineatus*) from the continent; larvae of *A. hyperantus*; varieties of *Arctia caja* and species taken at the various Field Meetings.

Mr. T. R. Eagles exhibited a selection of captures at the Society's Field Meetings including the Coleoptera *Demetrias imperialis*, Germ., and *Malachius marginellus*, Ol., from S. Benfleet and *Leptura (Strangalia) quadrifasciata*, L., from Byfleet.

Mr. C. Jarvis exhibited a large number of exotic Longicorn beetles.

Mr. A. M. Low exhibited the Diptera, ♂ and ♀ *Xanthogramma citrofasciatus*; ♂ *Volucella inanis*; series of *V. inflata* from Brockenhurst; series of 4 species of *Helophilus (versicolor, F., lineatus, F., lunulatus, Mg., transfusus, L.)* from Middlesex; ♂ *Chrysotoxum elegans*, Lw.; ♀ *Stratiomys potamida*, Mg.; series of *S. furcata* from Ireland, Co. Sligo; ♂ s of *Pachygaster leachii*; and 2 ♂ *Tabanus fulva*, Mg.

Mr. Hugh Main exhibited larvae of the Glow-worm, young trap-door spiders, and the bird-eating spider.

Mr. M. Niblett exhibited numerous gall-causing insects from the families *Cynipidae*, *Tenthredinidae*, *Aphididae*, *Psyllidae*, *Trypetidae*, and *Cecidomyiidae*.

There were other exhibitors but no details of their contribution to the evening's show reached the Secretary. Fortunately extra tables were available on this occasion, or the "reservists" might have caused congestion of the exhibits. As it was, there was great difficulty in seeing some of the Lepidoptera as the exhibitors of British Macrolepidoptera crowded their exhibits on one long table, around which during most of the evening there was considerable congestion. It is suggested that on future occasions shorter benches are the rule and that the British Lepidoptera be more scattered in the room.

9th NOVEMBER, 1933.

The PRESIDENT in the Chair.

Dr. Cockayne exhibited a short series of *Triphaena comes* ab. *rufa*, Tutt, and a yellowish clay-coloured form, all bred from a red ♀, from E. Aberdeenshire, 1932. Some of the red moths have the

reniform and orbicular outlined in pale yellow. The brood gave red 99, yellow-clay 96. Red is presumably dominant, as in other broods which have been recorded.

Mr. Robert Adkin exhibited series of the Tortrix *Polychrosis littoralis*, Westw. (Curt.), and called attention to the long periods over which this species had occurred during the season of 1933. The specimens were taken at light in his garden at Eastbourne. The first moth was met with on 21st May and one or more were taken almost nightly until 5th June. The second brood commenced to appear on 2nd August and continued from that date practically nightly until 29th September, the last being taken on 10th October, this brood having thus been on the wing for over two months.

Mr. C. N. Hawkins exhibited a short series of *Selenia tetralunaria*, Hufn., comprising 1st and 2nd *inbred* generations (spring and summer broods, 1933), offspring of a ♀ taken by Mr. A. J. Downes at Ascot in May, 1932. The spring brood were normal and from a pairing of these, ova were laid on 25th to 29th March, 1933, and they began to hatch on 13th April. The larvae were fed on sallow in a closed tin and pupated in due course. The pupae were kept indoors in a cool room until 20th Sept., 1933, when those then left were placed in an outside shed. Imagines began to emerge on 14th Aug., and the last perfect one on 1st Oct., but a ♀ which had become entangled in its pupa case was found alive in the cage that day (9th Nov., 1933) and one pupa appeared to be quite undeveloped and was presumably going over the winter. The moths were nearly as large and, with the exception of two of the ♂♂ which were pinkish ochreous, nearly as dark as the spring brood.

In the same box were also shown, on behalf of Mr. P. Bainbrigge Fletcher, some further specimens of the summer brood derived from the same batch of ova, but in this case the larvae had been fed on birch plugged in a bottle of water in an airy cage. The imagines were very much smaller, though still dark, and emerged between 24th June and 7th July. The pupae were kept indoors.

In the course of the discussion which followed, it transpired that Dr. Cockayne, who also had some of the ova, had fed his larvae on birch in a closed tin and that his imagines were large and dark and had mostly been very late in emerging (up to 30th Sept.) though one appeared in June; while Mr. Downes said that he had not bred the species this year, but that last year when breeding the summer brood from the same Ascot ♀, he fed his larvae in a tin closed for part of time and covered with muslin afterwards, and the imagines

were fairly typical summer brood specimens, viz., small and pale, and emerged between 13th and 30th July. They were kept indoors for the whole life cycle.

It appeared therefore that no conclusion could be drawn from the exhibit, but it suggested that inbreeding might have upset to a certain extent the normal economy of the species.

Mr. Eagles exhibited a series of 2nd brood *Leucania litoralis*, Curt.; they were notably smaller than the first brood.

Dr. Bull reported that he had, within the last few days, seen catkins on sallow. Also that he had six larvae of *Lasiocampa (Bombyx) quercus*, L., which were full fed, and that in September he noted numerous minor aberrations of *Polyommatus icarus*, Rott.

Mr. Wakely exhibited a short bred series of *Sitotroga cerealella*, Ol., bred from grains of oat.

Mr. Downes exhibited nymphs of the May-fly and noted that they kept in the mud during the day time but that at night they wriggled through the water.

Dr. Norman Joy opened a discussion on "What is a Species," of which the following is a short summary:—

He said that he wanted the whole question studied as Faraday suggested,—“The philosopher should be a man willing to listen to every suggestion, but determined to judge for himself. He should have no favourite hypothesis . . . be of no school . . . Truth should be his primary object.”

Dr. Joy's own definition of a species was “A group of individuals which can be *proved* to breed true after their kind, or by a constant difference in structural character, can be presumed to do so.”

Many scientists had never realised that as much depended on the instinct of the living thing as on its structure. He then stated briefly the meaning of Darwin's hypothesis known as Natural Selection. “The progeny of all living things vary in some small degree from their parents, and if the variation, however slight, helps them on in their struggle for existence, it will be carried on to the next generation, and go on increasing as long as it is of use. It is quite by chance that this variation starts in the right direction.”

Many scientists had quite forgotten that this was only an hypothesis; they went on repeating “Natural Selection” like parrots, without ever having taken the trouble to think out whether it fitted in with facts. Darwin wrote the following in a letter to Bentham four years after the publication of the *Origin of Species* “When we

descend to details we can prove that no one species has changed . . . nor can we prove that the supposed changes are beneficial, which is the ground-work of the theory."

A slide showing the distinguishing characters of the Coleopterous genus, *Gyrophæna*, was then shown, and it was argued that none of these characters could have helped an individual species in its struggle for existence.

Dr. Joy pointed out that the same applied to such insects as the Common and Large Garden Whites, in fact to all the known species of any genus of insects. He asked the members whether they could suggest any instance of closely allied species having gained in their struggle for existence by a difference in their structure.

Dr. Blair remarked that we could not be expected to know in sufficient detail the economy of any species to be able to judge the value to the insect of these minute details of structure, at which Dr. Joy said it was just the statement that he wanted, because it proved that those who believed in Natural Selection were trusting in faith only in one of Darwin's statements. He stated that he was very sorry he had not time to show slides of mimicry in butterflies, and several other points, which could be much more reasonably accounted for by admitting that there has been a special design in the whole of Evolution.

23rd NOVEMBER, 1933.

The PRESIDENT in the Chair.

Messrs. H. G. C. Jones, of Surbiton; C. B. Pinniger, of Chingford; G. A. Brett, of Cromwell Crescent, S.W. and K. P. Keywood, of Claygate, were elected members.

Mr. O'Farrell exhibited the larva of the dragonfly *Libellula depressa*, L., from the Black Pond, Oxshott, and pointed out the green alga associated with it.

Mr. Turner, on behalf of Mr. Sneyd Taylor, exhibited an imago of the Hemipteron *Acanthaspis obscura*, St., from the Northern Transvaal, bred from a nymph found in a crack of a mud-brick wall of a hut. On which the following note was communicated:—

"During April, 1933, I spent a few days on a farm near Potgieter-rust, in the Northern Transvaal, and, while there, I was quartered in a rondavel, a round building consisting of mud-brick walls, whitewashed over, and a thatched roof. In a crack in the

outer side of the wall I found a peculiar looking Reduviid nymph, as well as another specimen crawling on the wall at night. The entire dorsal surface, the legs and part of the antennae were covered with particles of earth, probably from the bricks, as there were also some patches of whitewash on the dorsal region. When at rest the insect might easily be taken for a small patch on the wall where the whitewash had flaked off.

“The nymphs apparently hide in cracks in the walls during the day, and come out to search for their prey at night.

“In captivity the nymphs fed readily upon soldiers and workers of the termite (*Termes badius*, Hav.), and the remains of some of the sucked-out termites soon appeared on the dorsal region of each specimen, in addition to the particles of soil already there. One cannot say, of course, whether termites are the natural food, but there were certainly some at work in the walls and roof of the building concerned.

“The nymphs were obtained on, or about, 21st April. On 28th July one of them moulted, and the resultant adult proved to be *Acanthaspis obscura*, St., a species which I had found to be common at light at Barberton, Eastern Transvaal, some years ago.”

Mrs. Stanley-Smith exhibited the so-called “Jumping Beans” from Mexico, the seed-vessels of which nourish the larvae of the Tortrix, *Carpocapsa saltitans*.

Dr. Bull reported the following Lepidoptera which this season had produced an abnormal extra brood:—

*Pararge megera*, L., 3rd on 6th of October: *Drepana binaria*, Hufn., 2nd on 30th of August: *Mamestra nana*, Huf. (*dentina*, Esp.), 2nd on 24th of August: *Agrotis puta*, Hb., 3rd on 7th of October: *Asthena albulata*, Hufn. (*candidata*, Schiff.), 2nd on 22nd of July: *Acidalia imitaria*, Hb., 2nd on 18th of September; and *Euclidia glyphica*, L., 2nd on 8th of August.

*Smerinthus ocellata*, L., was also reported as having a 2nd brood, and *Colias croceus* was recorded as having been seen on November 10th.

Mr. Hughes exhibited a very large number of the more local species of British Macro-lepidoptera obtained during the past year by an intensive campaign with a car on week ends and holidays, including the following:—

From Perthshire in April a series of *Poecilopsis lapponaria*, very dark forms of *Lampropteryx suffumata*, pink forms of *Taeniocampa gracilis* and slaty forms of *Pachnobia rubricosa*. From Aviemore in

April a nice series of *Endromis versicolora*. A few *Bapta distinctata*, H.-S. (*pictaria*, Curt.), from its old well known locality in Surrey in April. From his garden in Wallington, Surrey, a series of *Plusia moneta*, bred, and from Hampshire a bred series of *Apamea ophiogramma*. From the Breck district of the Eastern counties a fine series of *Dianthoecia irregularis*. A few *Euchloris smaragdaria* from the Essex coast of the Thames. In May the Breck area produced a series of *Chesias rufata*, Fab. (*obliquaria*, Schiff.), and of *Calocalpe cervinalis*, Scop. (*certata*, Hb.). From Huntingdonshire *Strymon pruni* were bred. A nice lot of *Dianthoecia albimacula* were obtained from the usual Kent coast locality, and in June on the Norfolk coast *Tapinostola elymi*, *Agrotis ripae* and *Mamestra albicolon*. From the Breck district in June *Agrophila trabealis*, Scop. (*sulphuralis*, L.), and from the Essex coast a bred series of *Malacosoma castrensis*, a long series of *Leucania favicolor*, more *A. ripae* and *M. albicolon* with *M. dissimilis*, 2 *Senta maritima* and 1 *Mamestra abjecta*. In July 5 *Leucania turca* from Hants, and in Dorset a series (some bred from ova) of *Coscinia cribrum*, 2 *Oeonistis quadra* and a series of *Hyloicus pinastris*.

There were also a long series of *Erebia aethiops*, Esp., (*blandina*, Fab.); a series of *Lygris populata* including melanic forms; a few *Noctua sobrina*, *Xanthia (Cosmia) paleacea* and *Noctua depuncta*. A fine series of *Triphaena comes* with forms of the var. *curtisii* including a very extreme one with hindwings almost totally black, series of *Noctua dahlia*, *Agrotis vestigialis*, *A. cursoria*, 2 examples of *Plusia bractea* and 1 of *Epunda nigra*.

In his remarks the exhibitor noted that *A. ophiogramma* came freely to ragged robin flowers, that *D. albimacula* was swarming on the Kent coast, that in feeding larvae of *M. castrensis* he sprinkled the food (sallow) with salt water, and that he found it best to kill *H. pinastris* with petrol.

Mr. Robert Adkin showed slides of, among others, the ectoparasitic larva *Oedematopsis scabricula*, Grav., on the host larva *Cacoecia (Tortrix) pronubana*, Hüb.; the remains of a larva of *Pieris brassicae*, L., with the cocoons of its parasite *Apanteles glomeratus*, L.; of *Limenitis sibylla*, L., with the cocoons of an unidentified parasite; and cocoons on grass stems of *Apanteles zygænarum*, Marsh., a parasite of *Zygæna filipendulae*, L.; also a parasitized Aphis and the fly that had emerged from it.

Further short series of slides were exhibited by Mr. Dennis mostly of flower-studies, Mr. Bunnet life-histories of insects, Mr. E. E. Sims and Dr. Joy.

14th DECEMBER, 1933.

The PRESIDENT in the Chair.

Mr. R. C. R. Crewdson, of Northwich; Mr. F. W. Sharman, of Peterborough; Mr. W. S. Elwood, of Wisbeach; and Mr. S. M. P. Pooles, of Peterborough, were elected members.

On behalf of Miss M. S. Harry, Mr. Jacobs exhibited a photograph of an oak-tree which was growing in a pot, where 20 years ago her father had placed an acorn. On it were 20 small hibernating larvae of *Boarmia roboraria*, Schiff., from ova laid by a female taken in June last. In warm weather the larvae occasionally change their positions, but otherwise one sees no sign of movement during the hibernating period.

Dr. E. A. Cockayne exhibited, on behalf of Dr. G. S. Robertson, a very fine banded form of *Oporinia dilutata*, Bork., known as ab. *latifasciata*, Prout.; a *Nothopteryx polycommata*, Hb., with a very dark brown ground colour; and an asymmetrically marked *Spilosoma menthastri*, Esp.; all were from Storrington, Sussex.

Mr. T. R. Eagles exhibited several species of beetles which attack furniture.

Mr. D. E. Kimmins read a short paper entitled "The Death-watch Beetle" (See p. Trans.). It was illustrated by lantern slides and examples of beetle channels in wood. In the discussion which ensued Dr. Joy said that these beetles were widely distributed, but only in old wood. It was noted that in some cases the colonies had a long existence, in others apparently only a short one, the result possibly of attacks by parasites. Dr. Cockayne instanced Tadworth Court as a case where a colony had died out. It was stated that insecticides were of very little use nor was the use of the vacuum cleaner. Mr. Bunnett called attention to the irregular protuberances on the larvae as an aid to progression in the galleries. The ticking or tapping of these beetles had never been heard by some of the coleopterists present; to others it was well known.

11th JANUARY, 1934.

The PRESIDENT in the Chair.

Dr. Cockayne exhibited larvae of *Trigonophora flammea*, Esp. (*empyrea*, Hb.) from ova obtained in Germany, which hatched on 4.xi.33. They had fed well on buttercup. No capture of a living

specimen in this country had been reported for many years. Mr. Jacobs reported finding a dilapidated example in a spider's web some 20 years ago.

Mr. Bliss exhibited a nice *Manduca atropos*, L., obtained at Purley this season.

Mr. Hawkins exhibited (1) two series of *Erannis aurantiaria*, Esp., the first from Wimbledon taken this year (1933), the second from Epping taken in 1932 and commented on the difference of depth of colour, the latter series being the darker. (2) A beautiful banded form of *Operophtera brumata*, L., two very uniformly dark specimens and one with the presence of a very large number of fine transverse lines.

Mr Robert Adkin exhibited Bonelli's paper "Descrizione di sei Nuovi specie d' Insetti Lepidotteri della Sardegna," which appeared in the publication of the Accadamy d. Science di Torino in 1824, and called attention to the type figure of *Aglais urticae*, L., var. *iohnusa*, Bon. He pointed out that the chief distinguishing feature of this figure was the absence of the two roundish spots on the disc of the forewings.

Mr. J. A. Downes exhibited some animals found in stumps of pine trees at Wisley on the day of the field meeting including:—larvae and pupae of *Laphidia* spp.; a Queen Wasp; a *Bombus* sp. infested with very active mites; a *Forficula* sp.; 2 young newts (in soft decaying wood); various beetles (Carabids, Staphylinids, Elaterids, etc.); pupae of *Bupalus piniaria*; also young larvae of one of the Stoneflies (*Perlidae*) and larvae of *Sialis lutaria* both from R. Mole at Cobham; and several Sticklebacks preserved in formalin, some with greatly swollen belly, showing presence of tapeworms (usually 3 in each) in body-cavity, also a specimen of the tape-worm (*Schistocephalus gasterostei*) removed from a fish: Byfleet, 4.i.34.

Mr. J. A. Downes and Mr. O'Farrell exhibited nymphs of various species of Paraneuroptera (Odonata) obtained by them during the Autumn and Winter, and communicated the following note. *Sympetrum striolatum*, Charp., nearly full grown from Esher Common on 10.i.34, in company with *S. scoticum*, Don., a three-quarters grown nymph of *Libellula quadrimaculata*, L., taken in the Black Pond on Esher Common last August. A single full grown nymph of *Brachytron pratense*, Mull., taken at Byfleet 2.i.34 at a point where the bed of the canal consists not of mud but of gravel. This is somewhat surprising as most Anisopterid nymphs appear to prefer a somewhat muddy bottom to the ponds that they inhabit.

The Zygopterids were represented by two nymphs of *Calopteryx splendens*, Harr. from the R. Mole, two supposed to be those of *Pyrrhosoma nymphula*, Sulz., and one of *Erythromma najas*, Hansem. One specimen of the former was very dark with conspicuously banded caudal lamellae and the other a yellowish one with much less marking on the appendages. The *E. najas*, a fine dark specimen in which the rows of white dots on the abdomen are very conspicuous, was taken at Byfleet on 2nd Jan. The *P. nymphula* were taken in one of the smaller ponds of Richmond Park, 10th Jan.

Lantern slides were then shown by several members.

Mr. Main showed biological details in the life-histories of several species of Lepidoptera.

Mr. Bunnett exhibited slides of the book-louse, *Atropos pulsatoria*, L., imagines and ova of the "cocktail" beetle, *Ocyopus olens*, Müll., and the larva of *Eumorphia elpenor*.

Mr. Blair exhibited slides of the luminous larva of a fly *Arachnocampa*, sp., inhabiting caves in Australia.

Mr. Bedford showed slides of several nests of birds each of which contained the egg of a cuckoo, and a series of studies of various local and rare marsh and damp ground plants mostly from Sussex.

Mr. R. Adkin presented the Reports of the Representative of the Society to the Annual Congress of the South-Eastern Union of Scientific Societies held at Norwich, 7th-10th June, 1933. And also his report of the Meeting of the British Association.

#### South Eastern Union of Scientific Societies.

ANNUAL CONGRESS, 7TH-10TH JUNE, 1933.

#### REPORT OF THE SOCIETY'S REPRESENTATIVES.

For the first time in the history of the Union the Annual Congress was held in the most northerly County included within the sphere of its activities, and the choice of Norwich as the place of meeting proved to be a particularly happy one. The city has many interesting features; its Cathedral and many old Churches; its ancient Castle, now restored and used largely as a particularly well-arranged museum; its modern Technical College which afforded ample and suitable accommodation for the reception room of the Congress and the Meetings of the various sections; and above all a surrounding country rich in geological, zoological,

botanical and many other treasures. The weather during the whole period was very fine, thus enabling a full programme to be carried out in its entirety.

The proceedings opened by the assembling of members at Head Quarters at 11 a.m., on Wednesday, and in the afternoon at 2.15 three separate parties were conducted around the city, the various places of interest being visited and their virtues duly pointed out. At 5 p.m. they all met at Carrow Abbey where they were entertained to tea by the Misses Coleman. The good people of Norfolk are noted for their hospitality and the Misses Coleman carried out this tradition most thoroughly; not only did they personally look after the comfort of their guests at teatime, but afterwards conducted them in small parties over the restored portions of the Abbey which are now occupied as their residence, pointing out, as they went along, the many interesting features of the place and its furnishings. Meanwhile, those not so occupied had the opportunity to ramble around the very beautiful grounds and inspect the ruined remains of the ancient Abbey, which are met with here and there throughout a great part of the estate.

In the evening at eight o'clock the members were officially welcomed by the Lord Mayor in the Stuart Hall, an ancient structure that has recently been renovated, we understand largely by the generosity of the Misses Coleman, and now provides a singularly pleasant meeting hall, capable of accommodating quite a large company. The Civic welcome having been given and suitably acknowledged, the new President, Prof. E. G. Salisbury, D.Sc., F.R.S., F.L.S., was inducted and read an address entitled "The Influence of Man on Vegetation": as it will be published in full in the "South-Eastern Naturalist" which it is hoped will be in the hands of all Affiliated Societies and Members before the end of the year, it is unnecessary to say more here than that it was full of interest, not only to the botanist but to every student of any branch of natural history.

Before proceeding further it may be well to mention an innovation, namely the holding of whole-day excursions. We have already referred to the richness of the surrounding country from a scientific point of view, and it was felt by the local committee that it was of such an extent that it could not be properly explored in the brief time available during the afternoons of the meeting days, and so it was arranged that one whole-day excursion should be held on each of the three days available; although it is to be feared that this

arrangement did detract to some extent from the attendance at the Representatives' Meetings, the excursions were so planned that they did not interfere with the work of the respective sections. Thus, the Geologists whose business meetings were fixed for the Friday spent Thursday in an excursion to Cromer and Overstrand to examine the Pliocene and Pleistocene Deposits of Norfolk, for which the places visited offered special facilities. The Botanists, who got through their business on Thursday, on Friday visited Calthorpe Broad and Horsey, while the Archaeologists, who also had disposed of their business on Thursday, went to Castleacre and neighbourhood on Friday. On Saturday a general excursion to the Broads was held, Wroxham Broad, Ranworth, Ludham, Barton Broad and back to Wroxham by motor boat. Each of these excursions was accompanied by one or more of the local authorities on the special subjects who acted as guides, and proved to be most instructive and enjoyable.

Returning now to the business of the Congress, on Thursday morning at 9.30 o'clock the Representatives' Meeting was held at which the reports of the Council and of the Hon. Treasurer were received and adopted, the Officers and Council for the ensuing year were elected, the reports of some of the Sections were submitted, and the meeting was then adjourned to Saturday.

The Archaeological Section met at 10.30 and having disposed of routine business the President-elect delivered an Address on "The Viking Period in England." This was followed by a lantern lecture on "Mediaeval Life in the Cathedral Priory of Norwich," by the Very Reverend the Dean of Norwich.

The Botanical Section also held their business meeting at 10.30, which being concluded, their President addressed them on "Evolutionary Sequence amongst Desmids" after which Mr. H. J. Howard lectured on "The Mycetozoa" illustrating his remarks by a number of lantern slides.

An important work that has occupied the attention of this Section for some years past is the preparation of a "Revised Flora of the County of Sussex." The work is now approaching completion and it is hoped to publish during 1934; if, therefore, anyone may have further notes which he wishes to have included, they should be sent in as soon as possible, and in any case before the end of the present year. They may be sent to the Editor of the list, Lt.-Col. Wolley-Dod, Berkeley Cottage, Mayfield, Sussex, or to the Hon. Sec. of the Section, Mr. F. Owen Whitaker, 51 Grosvenor Avenue, Carshalton, Surrey.

In the afternoon two excursions were held, one to Stratton Strawless Woods, Buxted Heath, and Swannington Common, chiefly for the investigation of their botanical features; the other to Cawston and Salle Churches, Heydon Hall and Blickling Hall; their archaeological points were the attraction, but it may be mentioned in passing that although these motor coach trips are arranged primarily for sectional investigation, they also afford excellent opportunities for seeing something of the surrounding country and often give opportunities for study quite at variance with those for which they are primarily arranged, for instance, while the archaeologist is examining the fabric of the ancient church or listening to a discourse on its special features, the zoologist may not infrequently spend an interesting half hour in the investigation of the inhabitants—the birds, insects and so forth—of the church-yard and its vicinity. Indeed, it is seldom that even the most specialised excursions are not of general interest to any member who may attend them, whatever his special study may be.

In the evening the Lord Mayor and Lady Mayoress held a reception in the Castle. A very large company were most hospitably entertained by them and an opportunity was given for a thorough inspection of the large and exceedingly well arranged museum, of which mention has already been made, and a most enjoyable evening was spent.

On Friday morning the Zoologists were at work on their business meeting at 9.30 and at 10 o'clock a "Talk" on Insect Migration was introduced by Captain Dannreuther and bade fair to occupy most of the morning, but was cut short at 10.30 for a Lantern Lecture by Mr. Hugh Ramage, M.A., F.R.C.Sc.I., F.I.C., on "Uses of the Spectroscope in Biology," which proved to be a most interesting exposition of highly technical work that has occupied many years of the lecturer's life, and which it appears probable may open up a new line of investigation in biological science. At 11.30 Mr. H. E. Hurrell, F.R.M.S., lectured on "Pond Life, with Special Reference to Rotifera and Polyzoa," and illustrated his remarks with a number of very beautiful lantern slides. Mr. Hurrell is evidently an enthusiast of this subject and kept us well entertained until past one o'clock.

In the afternoon a Geological Excursion went to Sprowston to examine exposures of brick-earth; Mousehold, where sections of gravels were on view: Thorpe Village, where crag is exposed; and

to Whitlingham Pit, an old disused chalk pit of interest not only to the geologist but a veritable zoological paradise.

In the evening Major Anthony Buxton, D.S.O., lectured, in the Stuart Hall, to a large and appreciative audience, on "Birds of the Broads," a commonplace subject enough, but the very remarkable and beautifully clear films of the nesting habits of many of the rarer species with which he illustrated his remarks rendered the lecture one of outstanding interest.

To those members who had been so fortunate as to attend the whole-day excursion the lecture must have been doubly interesting, for while at Horsey, Major Buxton had shown them the "Hide" from which the films had been taken and in many cases the nests of the rare birds, and in some cases the birds themselves, whose manners and ways were depicted in the films.

On Saturday morning the adjourned Representatives' Meeting was held at 10 o'clock, when further reports were received and a number of votes of thanks to local personages and institutions were proposed and duly honoured.

Notice had been given by one of the affiliated societies to alter rule 15 by the omission of the words "All such Representatives of Societies must be members of the Union," but as no representative of that Society was present to move the resolution it naturally dropped. The Hon. Secretary, however, took the opportunity to mention that it was the view of the Council, that as the affairs of the Union were, under Rule 5, managed by the Representative Assembly the Representatives forming that Assembly should at least have the status of a member of the Union, a view in which the Representatives assembled appeared to concur.

The remainder of the morning was devoted to the proceedings of the Regional Survey Section; their business meeting; the delivery of an Address by their President, and a lecture by Mr. W. J. Taylor (Town Planning Officer, Norwich Corporation) on "Town and Country Planning in and around Norwich" which was followed by a demonstration of Survey material made at the La Play House Field Study Meeting held in Norwich at Easter, 1932.

This concluded the Congress except for the whole-day excursion to the Broads, already mentioned, which kept those attending it well occupied until the late afternoon.

The 1934 Congress will be held at Reading, the date provisionally fixed being 11th to 14th July, a somewhat later date than usual but

which it is understood will meet the convenience of the Reading University Authorities, who are taking an active part in the arrangements, and which it is hoped will be equally convenient to all members who are interested in the activities of the Union.

ROBERT ADKIN.

H. J. TURNER.

#### BRITISH ASSOCIATION.

#### CONFERENCE OF DELEGATES OF CORRESPONDING SOCIETIES.

#### REPORT OF THE SOCIETY'S DELEGATE.

The British Association met at Leicester from September 6th to 13th. The weather was fine and a very full programme appears to have been successfully carried through. Unfortunately some of the sectional Meeting places were rather a long way from others, sometimes making it a little difficult for members interested in more than one subject to be present at all the papers they desired to hear. This, however, is a matter that it is not easy to overcome, especially in a city like Leicester that has recently added largely to its technical establishments which, needless to say, provide the most suitable accommodation for the purpose, and which have very wisely been built on its outskirts.

The Conference of Delegates was held on the afternoon of the Thursday in the Lord Mayor's Room, a very suitable apartment and conveniently situated. The President of the Conference, Dr. R. E. Mortimer Wheeler, read an Address entitled "The Centralisation and Co-ordination of Research in its Relation to Learned Societies." As he explained, being an archaeologist he treated his subject largely from an archaeological point of view, but for all that a good deal of his argument might well apply to Scientific Societies in general. He dwelt at some length on the usefulness of such institutions as the South Eastern Union of Scientific Societies as enabling a useful interchange of ideas among its constituent societies, and the working out by such a body of problems which were beyond the range of any one local Society; he instanced the Mosquito enquiry which the Union undertook just after the Great War and in which it was able to invoke the assistance of its constituent societies, to collate their investigations, and in the end to

produce a very useful report. He concluded by inviting what he termed a "descriptive discussion" of the efforts and needs of the various branches of organised science for more effective organisation.

This discussion was opened by a paper on "Zoological Survey" by Mr. G. C. Robson in which, among other things, he suggested that the production of a complete British Fauna should be aimed at. This led to a general discussion the chief bent of which, so far as I could follow it, was the old, old story. Much really valuable work often comes before local Societies—in many cases it is lost because they have not the funds to publish it, and it was suggested that some central institution, such as the South Eastern Union, should be available for the publication of such work, but here again the want of means for the purpose precluded anything of the sort. On the other hand, where the local society was in the fortunate position of having the funds to admit of the publication of the more important work that came before it, it was seldom available for reference, being buried in the local society's transactions. On being called upon, your delegate ventured to remark that at one time both the Association and the South Eastern Union used to publish a list of the more important papers read before their constituent societies and that he thought that if this were resumed it would to a large extent overcome the difficulty, but it was explained that the difficulty of preparation and the expense were too great for either to resume the work. So there the matter will probably have to rest until better financial times again come round.

It was suggested that the National Parks Committee appointed at a previous Conference should be dissolved, as there were no proposals at the present time requiring attention, and that the Conference should take over its work with power to re-appoint a Committee if it was thought necessary. The suggestion will go before the Council of the Association.

At the adjourned meeting on the following Tuesday the chief business was the reading of papers by Mr. T. Sheppard on "The Effects of Pollution on the Flora and Fauna of Rivers and the Responsibility of Local Societies therein," and by Mr. J. Fairgrieve on "The Amateur Meteorologist."

Papers read before Section D (Zoology) that may be of special interest to our Society were "The role of water in the physiology of excretion in insects," by Dr. V. B. Wigglesworth; "Experiments on the behaviour of insect parasites," by Dr. George Salt; and "The distribution of insects by currents at various levels in the

atmosphere," by Mr. P. S. Milne. Summaries of these will be published in the "Report" in due course.

Aberdeen has been fixed as the meeting place of the British Association in 1934.

ROBERT ADKIN.

25th JANUARY, 1934.

ANNUAL MEETING.

The PRESIDENT, Mr. C. G. M. DE WORMS, in the Chair.

The minutes of the Annual Meeting in Jan., 1933, the Treasurer's Report, and the Council's Report were submitted, read, and confirmed and the President read his Address. The new President, Mr. T. R. Eagles, was then introduced and proposed a Vote of Thanks to the outgoing President, Mr. de Worms, for his services during the past year and for his Address and requested that the Society might be allowed to print it. Votes of thanks were then passed to the Treasurer, and other Officers and Council. The Nominations for Officers and Council being unopposed were declared elected for the year 1934-5.

*President.*—T. R. Eagles.

*Vice-Presidents.*—C. G. M. de Worms, M.A., A.I.C., F.C.S., F.R.E.S. and E. E. Syms, F.R.E.S.

*Hon. Treasurer.*—A. E. Tonge, F.R.E.S.

*Hon. Librarian.*—E. E. Syms, F.R.E.S.

*Hon. Curator.*—S. R. Ashby, F.R.E.S.

*Hon. Secretaries.*—S. N. A. Jacobs and Hy. J. Turner, F.R.E.S., F.R.H.S.

*Hon. Lanternist.*—J. H. Adkin.

*Council.*—H. W. Andrews, F.R.E.S.; R. W. Attwood; F. J. Coulson; H. G. Denvil; J. A. Downes; T. B. Fletcher, M.Sc., A.I.C., F.R.E.S.; T. H. L. Grosvenor, F.R.E.S.; C. N. Hawkins, F.R.E.S.; M. Niblett; S. Wakely.

ORDINARY MEETING.

MR. T. R. EAGLES, PRESIDENT, in the Chair.

Mr. Bliss exhibited a short series of *Erannis leucophearia*, Schiff., from Wimbledon including dark blackish forms and a nice white-banded form.

Mr. Hawkins exhibited a portion of the trunk of an old pear tree showing tubular channels in the wood which had been occupied by leaf-cutter bees, there being numerous old cells still in situ.

Mr. Brett exhibited a dwarf larva of *Hemerophila abruptaria*, Thnbg. and contributed the following note:—

“This is the sole remaining larva of a brood of *Hemerophila abruptaria* I reared, the others of which pupated on 4th Dec. last.

It was a second brood, obtained as an F<sup>2</sup> generation from some grandparents captured last May.

Data of the brood:—Eggs deposited 24th Aug. to 1st Sept., hatched 2nd-10th Sept. Larvae spun up 22nd Oct. to 4th Dec.

In the cage in which this one was, there were 22 newly hatched larvae. Of these, 20 have pupated, one died, and this one is left. At no time did I find an extra one.

ANNUAL ADDRESS TO THE MEMBERS  
OF THE  
South London Entomological and Natural History  
Society.

Read 25th January, 1934.

By CHARLES G. M. DE WORMS, F.R.E.S.

LADIES and GENTLEMEN. You have once more heard from the Secretary and other Officers reports describing the continued very satisfactory state of affairs of this Society, both as regards its numbers and its financial position. It is particularly gratifying to note that our Membership is being annually swelled by an increasing contingent of the younger generation, who are taking a very live interest in all our proceedings. The attendances at our ordinary meetings have been well up to the average and the exhibits at these gatherings as numerous and variable as ever. Unfortunately the notes on these exhibits handed in for publication still leave a good deal of room for improvement. I therefore take this opportunity of emphasising the necessity of presenting adequate details for incorporation in our future "Proceedings." During the past year we have had the good fortune to listen to some exceptionally interesting papers on a variety of subjects. A novel feature was a debate opened by Dr. Joy on "What is a species?" It is to be hoped that our future programmes may include discussions of this type dealing with controversial topics of general scientific interest.

The Secretary has already laid stress on the remarkable season we experienced during the last year, both for the record amount of fine weather and for the abnormal numbers and variety of insects, in particular Lepidoptera. 1933 will long be remembered as an '*annus mirabilis*' among collectors in many branches of Natural History. The prolonged spells of sunshine brought much success and enjoyment to all the Field Meetings arranged by the Society.

The Annual Exhibition was once more held at the end of October

with very gratifying results. The attendance was well up to standard, and thanks no doubt the remarkably fine collecting season, exhibits were more numerous than ever, though as on previous occasions, the Lepidoptera was by far the predominating Order.

Among the many generous gifts to this Society during 1933 must above all be mentioned the fine collection of Coleoptera presented by Dr. Norman Joy. It constitutes a most valuable addition to the Society's collection and I should like to express once more the profound gratitude of the Council and general body of Members.

Undoubtedly the most outstanding event during the past year in the world of Entomology was the attainment by our Sister Society, now the "Royal Entomological," of the Centenary of its Foundation. The Celebrations in connection with this great occasion took place from 3rd to 5th May last. I would like to emphasize again what a pleasure and privilege it was to Mr. Eagles and myself to represent this Society and to present on its behalf a Congratulatory Address at that historic meeting. Seldom has there been such a distinguished and comprehensive assembly of Entomologists from all parts of the world. All who attended these celebrations will, I am sure, long look back with the pleasantest recollections on this memorable gathering. A concise account of all that took place has been compiled by the Delegates, and will appear in our Proceedings.

During this last year we have all been very sorry to note the prolonged absence through illness of our Treasurer, Mr. Tonge. We are extremely glad that he has made such a good recovery. We hope that there is every prospect of seeing him regularly in our midst again during the coming year and above all that the financial affairs of the Society may long continue to flourish under his guidance. I take this opportunity of expressing our very deep appreciation of the valuable service he has rendered so indefatigably as Treasurer over so many years.

During 1933 the Society has not sustained the loss of any of its Members through death and I believe this is one of the few occasions on which it has not fallen to the lot of the occupant of the Chair to record the obituaries of those taken from us in this way.

This concludes my introductory remarks and I now turn to the main part of my Address in which I propose to diverge somewhat from the procedure adopted by most of my predecessors in that I am not going to speak from a technical point of view on any one very specialised branch of Entomology, but I intend making a

survey in general terms of the subject of Lepidoptera, since I have little doubt that the majority of us here to-night are chiefly interested in this Order of the Insect Class. I propose to confine my remarks to the species of this country, and in doing so I am going first to deal with the matter from the field collector's standpoint, subsequently to discuss the present status and distribution of Lepidoptera in these Islands, and finally to touch upon many of the scientific aspects of the subject and some of the problems connected with it. I have chosen this theme as I consider that the inclination of most of our members is towards the study of Nature and the observations of insects in the field rather than in the laboratory.

If we look back, the collecting and scientific study of Insects and in particular of Lepidoptera are not very old and in their modern form were only in their infancy some 200 years ago. During the latter half of the 18th century after the systemisation of Insects by Linnaeus, reliable and well-illustrated books on Lepidoptera appeared both in this country and in Europe giving fairly concise accounts of all the known species, including their metamorphoses, habits, distribution, etc. But I will not dwell on these earlier pioneers who sowed the seed from which we are reaping the benefits to-day. Not much more than a hundred years ago anyone who was seen with a net was considered something very much out of the ordinary, in fact almost sufficiently so to be confined in an institution. Though the position has improved somewhat since then, I regret to say that this unfortunate opinion is still inclined to prevail among a considerable body of the uninformed public. However, the collecting of Lepidoptera has become to-day, without doubt, the most popular of any pastime devoted to the study of Insects in the field. Being essentially an outdoor pursuit, it gives pleasant and intermittent relaxation from the more arduous duties of life, and an equal interest and occupation for the years of a well-earned retirement. Many of us in our earliest days have had the urge to collect this attractive group of insects, but not so many have retained this keenness to their maturer years. But those whom the spark of enthusiasm still inflames are being continually impelled by a feeling of wanderlust which takes them to many remote parts of these Islands as well as Overseas. It is difficult to estimate how many hundreds, if not thousands of miles are covered each year by those in pursuit of Lepidoptera in this country alone. These distances are ever increasing with the modern and improved means of transport at our disposal, which affords means of reaching

our destination in as little time as possible and gives us a chance of penetrating to little known and unexplored localities, though there are many who will agree that our own feet are still the surest way of taking us from the beaten track.

As the spring months come round each year most of us interested in this study feel the desire of sallying forth in search of some new spoils, which may provide us with fresh excitement and satisfaction, whether it is the filling of a long-persistent gap or the addition of some new rarity to our collection. What is the great attraction of this pastime? Not only the alluring colours of the insects and their elusive and active habits, but there is also something very fascinating about the tracking down of some special quarry or the chance of picking up some unexpected prize. But there are many factors to contend with and our fickle climate is the great uncertainty, at the mercy of which we always find ourselves. How often in spite of every effort do we return home empty-handed and disappointed, with the feeling that valuable time has been vainly spent, but if undaunted by these failures, fortune is sure to favour us in the end and it is the spirit of perseverance mingled with good judgment which will bring us success in the long run. It is above all the study and capture of these insects by the individual rather than their acquisition at the hands of others that provides the greatest interest and value in collecting. The literature can teach us a lot on the subject, but not so much as our own observations in the field.

This brings me to something about collecting, its methods and objects and the systematic way of accumulating these insects not only for the cabinet, but for general scientific study and interest.

If anyone peruse a comprehensive work on the Lepidoptera of the British Isles, he will find we have about 2,500 species of Lepidoptera comprising some 800 of that very arbitrarily divided group of the Macro-lepidoptera and the balance consisting of that much neglected and oft-despised division of the "Micros." For any one individual to collect all these insects in a lifetime is probably an unattainable object however much time he may have at his disposal.

But a great deal can be achieved by adhering to a system and for this purpose one has the choice of two alternative policies to follow, either the building up of a general collection or specialisation in a particular branch. The objects and methods to be adopted for each I will deal with separately.

For anyone embarking on the venture of making a collection of Lepidoptera and particularly one that covers all the species in this

country I need hardly dwell upon or too strongly emphasise the essentials to be observed at the outset, such as the good presentation and condition of insects for the cabinet, the adequate labelling of all material, the great value of cataloguing all captures and above all of keeping exact records of everything done and observed in the field. The aspirant should also be a botanist and make himself familiar with all the foodplants of the various larvae and also with the habits, habitats and time of emergence of the respective species. It will be a matter for his own discretion how many of each he shall collect, but whatever the number it is not so much the question of local as of regional and racial variation which makes a collection of real scientific interest and value. As an example, parallel series of the northern and southern forms of such species as *Aglais urticae*, *Epinephele hyperantus*, *Polyploca flavicornis*, *Noctua primulae*, *Triphaena comes*, *Boarmia repandata* and many others form a very striking contrast.

The general methods by which Lepidoptera are obtainable are probably too familiar for me to deal with at length, but I will take the case of the perfect insect first. As each season comes round there are many who do not think of venturing forth much before Easter, and thereby miss some of the most prolific collecting of the year. The early species to appear provide a great deal of sport and fascination, such as is to be found in the searching for such insects as *Erannis (Hybernia) leucophaearia* on tree-trunks or the night hunting for other members of this family during the first months of the year. During March a powerful light may provide an exciting night in wooded localities where *Polyploca flavicornis*, *Pachys strataria* and *Apocheima hispidaria* abound. Towards the end of this month quite an active day may be spent in pursuit of *Brephos parthenias* or *B. notha*, whose tantalising habits need no comment from me. Early in April the shaking of the willow bloom may yield a literal rain of moths and give the subsequent thrill of picking out some "plums." But what greater thrill in May than to see members of the "Prominent" family come like a shower of bullets to an illuminated sheet! The summer months are never devoid of insects for which to search or places to visit. During this period we have such attractions as marram heads in July and the ragwort blossom in August to keep us busy. But there are many who cut short their season prematurely in September. The month of October is often the most productive of any for sugar and there is always the chance of a "star" night at the ivy bloom. Even as late as the last week

in November I have often seen more insects at light than at any other time of the year. During these last months such species as *Brachionycha sphinx (cassinea)*, and *Poecilocampa populi* may provide as much sport as the "Prominents."

But there are many sides of collecting other than the mere acquisition of imagines. The observation in the field of the early stages of the insects is of paramount importance to the systematic study of the Lepidoptera. How much time and patience do we expend each year in the search for the ova, larvae or pupae of some of our more elusive species? The successful breeding of Lepidoptera from these earlier stages is an art in itself, with a technique that can only be acquired after many years of experience. A single female may provide us with all our wants in a particular species, but how often does a promising-looking batch of larvae die off under our eyes, in most cases through our lack of knowledge of their requirements. There is still a great deal of room for research in this branch of collecting and the study of the life-histories of Lepidoptera still offers ample scope for research.

As to the specialist in any group of the Lepidoptera, his outlook, though limited, gives him the chance of perfecting our knowledge of the branch to which he devotes his energies. There are many for instance who confine their interests to our sixty species of Butterflies. For anyone living in the south of this country it is not difficult to obtain good series of nearly half this number in two or three seasons collecting. The scarcer and more local species can usually be readily obtained by visiting their restricted haunts. It then usually only remains for the butterfly collector to spend many a long day quartering some particular ground in the hope of acquiring some choice aberration which may often, when seen, elude the net at the critical moment. These freaks of Nature however form but a minor interest in a collection of this type; series of insects showing racial variation are of much greater value. Many examples of the truth of this statement are forthcoming, even among the unprepossessing *Pieridae*. There are several local forms of *Pieris brassicae* in this country, including a very large one found on the Dorset coast, the larvae of which feed on sea-kale. The eastern and western races of *Leptosia sinapis* vary appreciably in size and ground-colour. This also applies to the races of *Melitaea aethalia*. The Irish and particularly the Scotch forms of all our butterflies are remarkably different from those with which we are familiar in the South, as for instance *Epinephele jurtina* or *Polyommatus icarus*. Many years

could be devoted to the making of a comprehensive survey of all the forms of *Coenonympha tiphon* and of *Melitaea aurinia*.

There are many groups or even families of the moths on which a whole life time could be spent. The Agrotids could provide enough material for many a year of collecting and research, when we consider all the forms of such species as *Agrotis vestigialis*, *A. ripae*, *A. cursoria* which differ in every area in which they occur. Again the variation in *A. tritici* seems endless, but it will no doubt be found before long that more than one species is confounded under this name. *A. cinerea* is yet another insect, the forms of which vary amazingly according to its downland, breck-sand or shingle beach habitats.

But the general collector can doubtless derive a good deal more enjoyment from his pastime. There are, however, many who have got neither the opportunity nor the inclination to go far afield. For anyone resident in the country, the value of making a comprehensive collection of the local lepidoptera, and especially of the night-flying species, cannot be over estimated. Systematic sugaring of a locality and the employment of light and other methods for attracting the insects are essential for this purpose. The continuous working of an illuminated moth-trap throughout the season is an additional advantage, and in this connection I would like to emphasize the need of keeping precise records of all captures, together with those of the prevailing atmospheric conditions. For the past few years I have worked a light apparatus on these lines at my home in Surrey, and it is surprising how many species it has brought to light which I had no idea existed in the vicinity.

The fluctuations not only in numbers but in the groups of moths putting in an appearance, e.g., Bombyces, Noctuae and Geometers, according to the weather conditions, has been often remarkable and a correlation between the two calls for much thought and research. The working of a single locality can be extended to a definite district embracing a given area. Some very valuable data have already been obtained by systematic collecting and observation in a neighbourhood of this kind. A single individual can get together an immense amount of useful material for this purpose in two or three years. Unfortunately a local collection of this type from a given district is seldom seen, but it is to be hoped that more work on these lines will be carried out before long. For instance what little do we know of the Lepidoptera inhabiting many of our larger towns or even the Metropolis itself. London probably harbours

many more species than we may imagine, especially when we realise that about half the Macrolepidoptera on the British list are obtainable so near to it as Wimbledon Common.

As to those whose travels take them to all parts of these Islands, their opportunities for activity in the field are for the most part limited to week-ends, holidays, a few weeks in the summer and an occasional nocturnal outing during the intervening periods. At the outset of each season most of us map out a definite plan of campaign and concentrate on obtaining a few particular species for each period of the year. But how often even when we have found out all to be known about a particular insect do our plans miscarry, perhaps, as in the last year, through a season of abnormally early emergence, or we may just miss the one night when a special moth is abounding. But given average good fortune we shall probably strike one of those periods when everything goes according to plan, when the sun shines all day or when our previous failures are compensated by one or two of those phenomenal nights when the sugar patches are seething and insects come in such clouds to the light that it is difficult to box our requirements quickly enough. In my experience there are not more than half a dozen of these occasions annually, and then they may be confined to quite a small area.

Again we often have to ask ourselves where we can spend a few weeks holiday in which to devote all our energies to our pastime. We can either spend the period making a tour of several selected localities, picking up what may stray into our path, or we can devote the whole of the time to the working of one district; the latter in my opinion is usually the most advantageous policy to follow. There are many such areas up and down the country which still yield a good harvest for an energetic collector. In the South such a district as the New Forest can still be regarded as a gold mine for most of the woodland species. No better places than Freshwater Bay or Swanage could be chosen for their variety of coastal insects, while the Torquay district is still the headquarters of such choice species as *Lithosia caniola*, *Heliophobus oditis* (*hispidus*) and *Leucania putrescens*, together with a good proportion of the autumn migrants. Wicken Fen is usually a Mecca for the entomologist in search of the Fen insects, but an even greater abundance of these can be obtained on the Norfolk Broads, which are still the only known home of *Nonagria cannae* and *Leucania brevilinea*. Going further north the Lancashire coast can hardly be surpassed for the sandhill Lepidoptera, while for the heathland species Witherslack still holds

one of the foremost positions both for variety and abundance. Though the South provides many excellent collecting grounds these are in many ways far excelled by those in Scotland, where the profusion of what species there are is amazing compared with southern localities. Such an area as Rannoch is well worth a month's systematic working at different seasons of the summer. The profusion of Lepidoptera is sometimes almost incredible. Going still further towards the Arctic some of us may sooner or later find ourselves in that remote outpost, the Shetlands, in search of the elusive *Crymodes exulis* and many of the remarkable forms of Lepidoptera which occur in these northerly regions.

But we are apt to follow too closely in the steps of our forefathers and continually to revisit localities of which the reputation has been handed down from generation to generation. We have still a lot to learn about our Lepidoptera, their variation, fluctuation and distribution. It is by the penetration to new spots and the breaking of fresh ground that the greatest additions will be made to our knowledge of this subject.

#### THE PRESENT STATUS OF BRITISH MACROLEPIDOPTERA.

This brings me to some remarks about the present-day status and distribution of certain of our Macrolepidoptera, of which I have had the opportunity of taking stock during the last few years both from my own observations and from those of others. We so often hear it said by members of the older generation that collecting Lepidoptera is not what it used to be and that both numbers and species are steadily on the decline. Is this really the state of affairs to-day? I will state at the outset that I consider that there is very little evidence for this assertion. It has always been my opinion that many of our more local Lepidoptera are far less uncommon than we would suppose. We are familiar with the main causes of fluctuations in numbers due chiefly to climatic changes, alterations of environment and the varying prevalence of larval and other parasites. We read that *Papilio machaon* and *Melitaea athalia* used to be found regularly in the vicinity of London, and the sole apparent reason for their disappearance has been the encroachment of human habitations, the only real danger with which our species are faced; but fortunately bricks and mortar are not spreading so quickly as to kill all our countryside. Over-collecting is another factor brought to the forefront of every argument on this subject.

Again there are very few instances in which this can be said to be the direct cause of an insect's disappearance.

During the last century we have lost at least three of our indigenous Butterflies. In the case of two of them, the "Large Copper" and the "Black-veined White," their sudden disappearance was unquestionably due to the change of environment in places where they always had a precarious foothold. *Cyaniris semiargus* (*Lycaena acis*), the Mazarine blue, presents great mystery and there are many who believe that it still lurks in some remote haunts, specimens having been recorded up till ten years ago.

I will now mention the cases of some of our existing Macrolipidoptera, chiefly the less common species, and I will make special reference to their numbers during the season of 1933, but without giving away any "trade" secrets. To begin with the Butterflies, *Papilio machaon* has greatly increased in numbers in recent years, not only in Wicken Fen but also on the Norfolk Broads, where last August a friend and myself were able to collect some fifty larvae of all sizes in an area of as many square yards. *Leptosia sinapis* is another species which is greatly on the increase. In parts of Surrey, where a few years ago it was extremely scarce, it is now quite a common butterfly. This is largely due to the opening up of its haunts and breeding grounds. Last year saw quite an invasion of *Colias hyale*, large numbers being seen and taken in eastern England between August and October. During 1933 that much sought after and elusive species the "Purple Emperor" (*Apatura iris*), was, I can vouch from personal observations, in relative abundance in many localities over a wide area. When it disappeared from the New Forest, its last stronghold was thought to be gone. Apart from the destruction of the older woodlands, nothing is so detrimental to this species as the cutting of the tallows bordering rides. What finer sight is there than that of this splendid insect sailing around the tree tops and occasionally making a nose dive to earth, rising as swiftly as it swooped, but nearly always just out of reach of the collector's net.

The last few years have seen the remarkable spread of *Polygonia c-album* from its western haunts. *Limenitis sibilla* is also annually extending its range. Of late *Melitaea athalia* has been increasingly plentiful in many localities and its disappearance from any one is due above all to the smothering of its delicate foodplant by the woodland undergrowth. *M. aurinia* has also turned up in many new spots, some within thirty miles of London. *Strymon* (*Thecla*)

*pruni* has been very abundant in its restricted haunts for the last five years. After many seasons of relative scarcity, last summer saw *Rumicia* (*Heodes*) *phlaeas* in prodigious numbers in several districts. *Polygonmatus icarus* was equally plentiful last August. The regional and seasonal fluctuations of *Agriades coridon* and *Agriades thetis* (*bellargus*) will always be the source of much dispute and speculation. In many places in Sussex and Kent both species were in swarms last year whereas they were almost non-existent in localities where they had been abundant only a few years before. I am glad that from personal experience I can also say that *Lycaena arion* "the Large Blue" is distinctly on the increase in its two western headquarters and in places where it is not protected. This is undoubtedly due to improved conditions, such as the spread of the anthills, rather than to the absence of collectors. Among the Skippers, *Carterocephalus palaemon*, which was extremely scarce in the early part of this decade, was in abnormal numbers last year.

What I have said goes to show that there are still a few butterflies left in these Islands and the same remarks apply to the moths. We are told that such attractions as "light" and "sugar" have greatly deteriorated and that many of our species are on the verge of extinction. It is true that in the last half century there seems to have disappeared from the list some dozen or more species of moths. But have they really gone? During the last two years I have had the good fortune to take two insects believed to be extinct, *Acrionicta auricoma* and *Madopa salicalis*. Such a rarity as *Notodonta bicolor* has been rediscovered in Ireland. Many of these scarce species certainly do still occur in remote spots. As so often happens a collector perhaps specialises in one of these rarities and knows all about its haunts and habits. On his decease the insect apparently dies out too. To compensate for these supposed losses many species formerly considered rare are now becoming increasingly common. At the beginning of the century *Plusia moneta* was almost unheard of: now it is a pest. Thirty years ago such species as *Dianthoecia albimacula*, *D. barrettii*, *Nonagria sparganii*, *Leucania faveicolor*, *Mellinia ocellaris*, etc., were considered great prizes. Now they are turning up in greater numbers and over a wider range each year. In the last few years we have seen the remarkable spread of *Hyloicus pinastri* in its newly-discovered southern habitat, where it had certainly been previously overlooked. *Parascotia fuliginaria*, at one time one of our great rarities, now that its life history has been fully understood, is found regularly over a wide area, and it is to be hoped

that the still more elusive *Hydrilla palustris* will soon follow the same course.

It would take too long to enumerate all the species of moths which probably have a much wider range than we imagine. But I will take one or two cases. Such insects as *Phragmatoecia castaneae* (the Reed Leopard) and *Meliana flammea*, formerly considered to be confined to the Wicken Fen district, have been found in similar surroundings in Dorset. It is difficult to believe that these species only occur in two isolated localities some 200 miles apart. The same remarks apply to that northern moth, *Brachionycha nubeculosa*, which up to date is known from only two small areas at Rannoch and Aviemore, some fifty miles apart.

A systematic search of likely localities is sure to reveal many further habitats of hitherto very local species. This course has certainly proved fruitful in the case of such insects as *Nonagria neurica*, and *Lithosia pygmaeola*,\* which have recently been discovered in the eastern counties. Other species are without doubt extending their range. This last season *Catocala promissa* appeared quite commonly in the south-east, while there have been several records of *C. sponsa* well outside the New Forest; 1933 also saw the reappearance of several moths which had been extremely scarce for many years. Among these can be mentioned *Oeonestis quadra*, which was very numerous in many southern districts. Other uncommon insects such as *Acronicta alni* and *Moma alpium* (*orion*) were in unusual numbers last year. *Leucania albipuncta* is yet a further species which has been recorded again after a long interval. Last year also saw a great invasion of the two Hawkmoths *Manduca* (*Acherontia*) *atropos* and *Herse convolvuli* and among the rarer immigrants the capture of several *Leucania l-album* was notable.

In the foregoing narrative I have tried to give a bare outline of the status and distribution of some of our Lepidoptera as we find them to-day and I think that the picture I have painted is not too black a one, nor is the outlook too gloomy. Our Lepidoptera, I feel confident, are far from being on the decline or on the verge of extinction, but there are still many problems connected with their collection and study which with further research may one day be solved.

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\* This *pygmaeola* is now recognised as a form of *Lithosia pallifrons* and not of *lutarella*, i.e., *Lithosia pallifrons* f. *pygmaeola*. [See Kettlewell and Tams, *Ent. Rec.* (1932) p. 8.]—Hx.J.T.

SOME OF THE PROBLEMS CONNECTED WITH THE STUDY AND  
COLLECTING OF LEPIDOPTERA.

I now turn to the final section of this Address in which I will deal briefly with some of the scientific aspects connected with the collecting of Lepidoptera and the problems which present themselves in the study of this vast group of Insects. I have already spoken of the need for the systematic investigation into the habits and life-histories of these insects. But probably not many of us when we are in the field realise or give a thought to many of the phenomena and perplexities that Nature has put before us. Our knowledge of the fundamental factors connected with the development and evolution of this Order is still in its infancy. The four-stage metamorphosis is itself a phenomenon which calls for a good deal of thought and study. What little do we know of the embryonic development of a larva or the mechanism by which the plant-juices it absorbs are transformed in the pupa to build up the many splendid colours and patterns with which we are familiar in the perfect insect. Recent research has shown that the pigments in the scales on the wings of many species of Lepidoptera belong to the same group of chemical substances as those from which the colours of flowers are derived. This analogy is of great importance if we attempt to form some idea of the means by which these colours are synthesised during the embryonic development of the imago. The purpose of many of these colours and patterns is still a matter of much conjecture. Mimicry of other insects, warning colours and adaptation to surroundings form their main objects in Nature.

There are many other mysteries in the habits and life of Lepidoptera on which we are slowly getting some light. To take one or two examples; recent work has disclosed the great part played by certain scent glands of male butterflies as a method of sexual attraction. Again research has disclosed organs of smell in the legs of many female Lepidoptera used for testing the foodplant on which to deposit the ova. The genetics of Lepidoptera has been much to the forefront of late and much useful work has been done in trying to elucidate the origin of such phenomena as melanism and abnormal aberrations. Through the thorough inspection of genitalia in recent years several insects thought to be one species have been separated into two or more. The importance of the economic side of the study of this Order cannot be too greatly emphasised. The destruction of vegetation by many lepidopterous larvae

costs the world untold sums of money annually. Research on certain of their enemies such as the ichneumon flies has rendered invaluable assistance in coping with these plagues.

I have touched on only a few of the problems which beset investigators in the laboratory or museum, but there are equally many which we encounter when collecting in the field. I will only make a brief reference to a few of these. We are all familiar with many of the anomalies of collecting especially in the case of the night-flying species. I have already referred to attempts to correlate atmospheric factors with the attraction of moths to light. Much valuable work has recently been done in this line by Dr. C. B. Williams at Rothamsted with special reference to the times of flight of many species. Still more research is needed into what particular range of wave lengths in the spectrum is most attractive to these insects.

The migratory habits of many species is another problem in which most of us are interested. Only last year a campaign was launched to collect careful records of the immigration of certain lepidoptera and much useful information has already been gathered.

There are many other phenomena which require much further investigation, such as "assembling" and other sexual relationships of species.

By dint of keen observation in the field and careful research at home we shall gradually get enlightenment on many of these mysteries. These closing remarks are above all addressed to members of the younger generation, for it is to them that we look to bring new blood and fresh impetus into research in helping to solve many of the problems which Nature has set us.

As these are my final words from the Chair, I should like in conclusion to express my thanks and deep appreciation to the Council and members of the Society for their great assistance in making the past year one to which I shall always look back with the pleasantest memories.

It now only remains for me to extend a very hearty and cordial welcome to my successor, Mr. T. R. Eagles, who has for many years now keenly interested himself in the affairs of the Society. I know he will carry on its high tradition and do everything to promote its welfare. I wish him every success and good fortune during his term of office.

## Notes on British Mecoptera.

(Plates I., II.)

By E. E. SYMS, F.R.E.S.—Read 9th February, 1933.

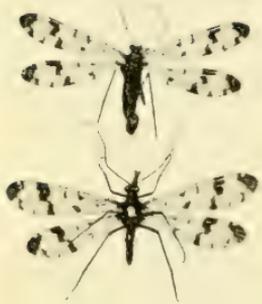
The Mecoptera or "scorpion flies" as they are commonly called, were formerly considered as part of the Neuroptera. Latreille erected for them a Family which he called PANORPATAE. R. MacLachlan, in his Monograph of the Neuroptera-Planipennia divided them into three sections of which the PANORPINA formed the third. A. S. Packard, 1886, erected the order MECAPTERA for them, the name being subsequently changed by J. H. Comstock, 1888, to MECOPTERA. They form a small Order consisting of about 250 species, divided into five families, of which only two, the *Boreidae* with one, and *Panorpidae* with three species are found in Britain.

These insects, although common and widely distributed, do not seem to have received the attention they deserve. F. Brauer in two papers published in 1851 and 1863 seems to be the first to give us a complete life-history of a Panorpid, his description referring to *Panorpa variabilis*, Brauer, *P. montana*, Brauer, and *P. communis*, L. E. P. Felt, 1896, gave us an incomplete account of an American species, but T. Miyaké, 1912, published an extensive study of the Japanese species *Panorpa klugi*.

Our British Mecoptera can be easily recognised by the prolongation of the head into a beak, at the end of which are the mandibles. In the genus *Panorpa* there are four nearly equal membranous wings, but in *Boreus* the wings of the female are reduced to scales, and of the male to bristles.

The species of *Panorpa* are to be found in damp shady places where there is an abundant growth of coarse vegetation. A typical place is among the bushes growing upon the bank of a roadside ditch. Here they rest upon the upper side of a leaf slowly raising and lowering their wings. The female has her abdomen extended in a straight line but the male has the enlarged forceps-like genital appendages recurved over its back. This scorpion-like attitude has given rise to the name Scorpion-flies. When disturbed they seldom fly far, but often simply drop down into the herbage below and then are very difficult to see, the black markings on the transparent wings harmonizing with the light and shade of their new position. When they do fly, their flight is of short duration, seldom more than a few yards, and reminds one of that of the smaller dragonflies. If they





EXPLANATION OF PLATE I.

1. Ova of *Panorpa germanica*, L.  $\times$  5.
2. Larva of *Panorpa germanica*, L.  $\times$  3.
3. Pupa of *Panorpa germanica*, L.  $\times$  5.
4. *Panorpa communis*, L., ♂ and ♀.
5. *Panorpa germanica*, L., ♂ and ♀.
6. *Panorpa cognata*, Ramb., ♂ and ♀.
7. *Panorpa communis* ♀, internal skeleton.
8. *Panorpa germanica* ♀, internal skeleton.
9. *Panorpa cognata* ♀, internal skeleton.

EXPLANATION OF PLATE II.

10. *Boreus hyemalis*, L., Larva.
11. *Boreus hyemalis*, L., Pupa.
12. *Boreus hyemalis*, L., ♂ .
13. *Boreus hyemalis*, L., ♀ .
14. *Boreus hyemalis*, L., ♂ , genitalia.
15. *Panorpa germanica*, L., dorsal surface  
of segments 4 and 5.



Photo : E. E. Syme.



are handled they try to bite and exude from the mouth a brownish fluid that has an objectionable odour; the males also use their forceps and are capable of giving a nip with them. Of our British species *P. germanica*, L., and *P. communis*, L., are common, there being two broods each year, the first in May and the second in August. *P. cognata*, Ramb., is rarer and I know very little about its habits.

A certain amount of confusion exists as to the food of the adult *Panorpa*. This is partly due to an account published by Kirby and Spence in their "Introduction to Entomology" of a conflict between an insect to which they refer as *P. communis* and a dragonfly; this is said to have been seen by E. Lyonnet, but there must be some error as to the insect concerned, which may have been an example of the genus *Bittacus*. I have tried to discover what the adults feed upon when at large, but I have only three times succeeded in finding *P. communis* in the act of feeding. On one occasion a female was feeding upon a hover-fly and on the other two occasions they were feeding upon lepidopterous larvae; the larvae were capable of moving but the hover-fly was dead. One August, after a shower of rain I watched a *P. germanica* drinking the water upon the petals of a bramble. At first I thought it was feeding upon the petals, but on closer examination was convinced that it was only taking the water. In captivity I have offered them various insects, worms and raw meat upon all of which they would feed if the insects were dead or injured; the worms had to be cut into pieces before they were touched. When living healthy caterpillars were offered they were not attacked though they remained in the cage for several days, but if their skin was broken they were attacked at once by the scorpion flies.

My early efforts to obtain ova from these insects were unsuccessful, it was only when I kept the atmosphere of the cage at saturation point that I obtained them. A cage was fitted up with a layer of fine soil about 1" deep at the bottom; upon this damaged insects were placed. The Panorpids wandered about the cage and, although they passed close to the food, seemed not to see it, only when they actually touched the food, generally with their feet, did they seem to recognise it. Then the beak was thrust into the damaged place and the food taken.

When about to oviposit the female wandered about the cage examining all crevices with her ovipositor; no attempt was made to bore into the earth with it and the ova were placed in a crack in the soil or between the soil and the side of the cage. On one or two occasions ova were placed upon the surface of the soil. The ova were generally in a cluster about  $\frac{2}{3}$ " below the surface of the soil. The earliest batch of ova from *P. germanica* were obtained on 4th May and consisted of 36 eggs, the latest on 21st September of 7 eggs.

I have succeeded in keeping alive a female for 5 weeks, but have

never been able to obtain a second batch of ova, though as there were ova in the female after death it is most probable that more than one batch is laid when the insect is at liberty. No special precautions seem to be taken by the female to place the ova near food, in fact ova were deposited in cages where food was absent.

The ova are elliptical 1mm. by .75mm., the surface of the shell covered with shallow pits; they are coated with a fluid that causes them to adhere together. When first deposited they are pale yellow, but turn to a dirty brownish yellow before hatching. They are extremely delicate and must be kept in a moist atmosphere or they shrivel up and die. The larva when first hatched is very active, wandering about the cage, often passing close to the food, but apparently not noticing it. They are a dirty cream colour with a light brown head and a conspicuous brown chitinous shield upon the first segment of the thorax. The abdomen consists of ten segments; the first eight have each a pair of prolegs and the tenth segment has a peculiar retractile four branched anal fork. On the dorsal surface of the first nine abdominal segments there is a row of annulate-pilose spines on each side of the median line; the tenth has a single spine of the same character. These spines are much reduced at the first moult on all but the last three segments. As the larva gets older it burrows in the damp earth making a tunnel which comes to the surface under the food. If the food be turned over suddenly the head of the larva can be seen retreating down this tunnel. They feed up rapidly, eating much the same food as the adults, but seem to prefer that which is much decayed to freshly killed insects. They become full fed in about four weeks and then burrow into the drier part of the soil, excavate an elliptical cell in which the larva curls up and shrinks to about half its original size before turning into a pupa. In the case of spring larvae they pupate in about four weeks and emerge after another two weeks, those full fed in the autumn remain as resting larvae in the cell until the spring. In captivity the pupa is just below the surface of the soil. I have never succeeded in opening a cell in such a way as to be sure of the position taken up by the pupa, so cannot say if it is vertical or horizontal. The pupa is white, the head prolonged but not so much as that of the adult. The male has the genital bulb curved over the dorsal surface. Before emergence the pupa breaks its way through the cell, comes to the surface of the soil and there the pupal skin is cast. On first emerging they have a glossy appearance similar to that of a freshly emerged dragonfly.

The mating of Panorpids is very interesting. According to Mercier (1915) the male approaches the female vibrating his wings, the female responds by doing the same; then the male exudes a drop of fluid from his mouth, this fluid hardens forming an opaline pellet, which is placed upon the soil. Upon it the female begins to

feed, dissolving it with a brown fluid from her mouth. Whilst she is feeding the male seizes her by the abdomen with his genital forceps and these gradually move back until the genital opening of the female is reached. When the pellet is consumed a second pellet is supplied by the male. This pellet I have never seen in my cages, although I have often seen pairing effected, but in all cases the female was feeding upon dead insects, so it may be that the pellet is offered when food is absent. In this connection it is of interest to note that the salivary glands of the male are much larger than those of the female.

Many Panorpidids have on the dorsal surface of the abdomen a structure the function of which I do not know. In *P. germanica* it consists of a bilobed projection covered with strong bristles, on the posterior margin of the fourth abdominal segment. Under this projection on the fifth segment is a shallow pit in the centre of which is a conical mound bearing a sharp pointed spine directed forward. This structure is only found in the male so it may be of sexual importance. MacLachlan suggested that it might be a stridulatory organ, and Felt thought that it might be a scent gland, but its function has yet to be proved.

In the field our British Panorpidids can be roughly determined by means of the wing markings; in *P. communis*, the markings are black and arranged in bands, whilst those of *P. germanica* although black remain as spots. In *P. cognata* the markings are brown and are much less distinct.

The genitalia of the males offer an easy means of distinguishing the species, they are large and all the important parts can be easily seen with a pocket lens. The male abdomen ends in a genital bulb terminated by a pair of forceps, which have a distinct shape for each species. On the ventral surface of the bulb and closely applied to it is a forked appendage, the "hypoalvae." In *P. communis* the branches of the fork are short, flat, dilated and truncated at the apex, those of *P. germanica* are cylindrical and closer together at base and apex than in the middle; in *P. cognata* they are long, slender and divergent from the base. It has always been difficult to distinguish the females, but F. Carpenter (1931) has shown that the female possesses a chitinous plate within the ninth segment of the abdomen that exhibits the desired specific variability and individual constancy.

*Boreus hyemalis*, L., our remaining representative of the Mecoptera, is widely distributed in Britain appearing as adult in winter. Unlike the Panorpidids it is entirely vegetarian both as larva and adult.

Brauer (1862) worked out the life-history and C. L. Withycombe (1924 and 1926) also gave us some interesting information.

These authors have told us that although the female is provided with an ovipositor, the eggs are placed at the base of the moss. In Epping Forest where this insect is common the principal food is *Mnium hornum* although other mosses are sometimes eaten. The

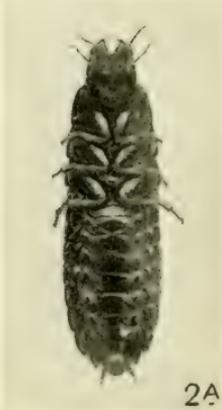
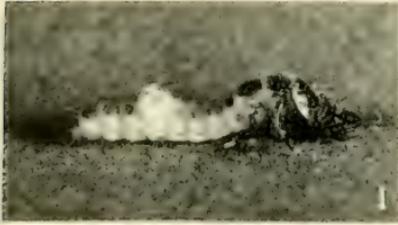
ova which are .5mm long by .3mm broad hatch in about ten days and the first stage larvae have abdominal prolegs which however are lost at the first moult. I have never seen the ova or the larva in its first instar. Larvae are found at the root of the moss or in the earth just below; they are slow in movement their body being very much curved. When about to pupate they construct a vertical burrow to the surface of the moss; this is thinly lined with silk.

The pupa is much more active than the larva, wriggling up and down this burrow when disturbed. Pupation takes place from September to November; the perfect insects emerging between September and December. The pupa is at first white and gradually changes to yellow before emergence. The mouth parts are somewhat similar to those of the perfect insect, but the rostrum is not so long. The wings, legs and antennae of the male are arranged along the sides of the thorax and abdomen. When about to emerge the pupa works its way to the mouth of the burrow or sometimes on to the surface of the moss. At first the adult is greenish yellow but this changes to a bronzy brown in a few days. They will live for five or six weeks in captivity if provided with damp moss, into the rosettes at the top of which they thrust their rostrum and feed upon the leaves, crushing them with their mandibles. In captivity the females live much longer than the males.

Whilst watching a cage containing several of these insects, I saw a male approach a female that escaped by jumping away, he gave chase and at last he gripped the hind femur of the female with his genital forceps; a struggle followed ending with the male getting his abdomen under and his wings over the body of the female. In this position she was held whilst the genital forceps were released and pairing was affected. Immediately this took place the female became inactive her feet were drawn up and the male gripped her rostrum between his wings, thus holding her upon his back and in this position they remained for several hours.

During August I find the larvae in two stages of development some about half the size of the others. These small larvae I have kept in captivity and find that they become full fed about May and pupate in the autumn, so that some if not all larvae take two years to arrive at maturity.





Photos 1-3, 5-6, H. Main; 4 & 7, E. J. Bunnett





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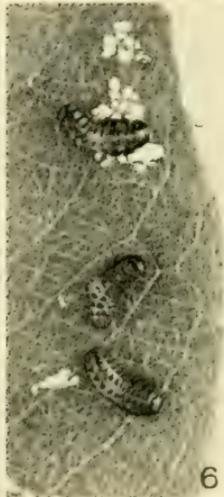


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Photos 1, 3 & 9, E. J. Bunnett; 2, 4-8, H. Main.

EXPLANATION OF PLATE III.

1. *Cicindela campestris* × 2.
2. *Carabus catenulatus* × 2.
- 2a.     "           "           (ventral).
3. *Nebria brevicollis* × 2.
4. *Acilius sulcatus* × 1.
5. *Hydrophilus piceus* × 1.
6. *Necrophorus* sp. × 2.
7. *Endomychus coccineus* × 2.

EXPLANATION OF PLATE IV.

1. *Anatis ocellata* × 2.
2. *Lucanus cervus* × 1.
3. *Geotrupes stercorarius* × 1.
4. *Lampyris noctiluca* × 2.
5. *Blaps mucronata* × 2.
6. *Pyrochroa coccinea* × 2.

EXPLANATION OF PLATE V.

1. *Meloë proscarabaeus* (triungulin) × 60.
2. *Meloë brevicollis* (prepupal stage) × 2.
3. *Rhagium mordax* × 2.
4. *Donacia* sp. × 2.
5. *Timarcha tenebricosa* × 1.
6. *Phyllodecta vitellinae* × 2.
7. *Cassida equestris* × 2.
8. *Ceuthorrhynchus pleurostigma* × 5.
9. *Scolytus destructor* × 2.



**Beetle Larvae.**  
(*Plates III., IV., V.*)

By K. G. BLAIR, D.Sc., F.R.E.S.—*Read 23rd March, 1933.*

“Beetles” as Dr. Joy says in his recent book\* “may be found in almost any situation,” and the same remark applies almost equally well to their larvae. In and upon the earth; on the leaves of plants and at their roots, as well as in their tissues; in carrion, dung and fungi; in water, both stagnant pools and running streams; in the nests not only of birds and small mammals but also of Hymenoptera, particularly of ants, and in our own dwellings, not only destroying the fabric but also in our stored food supplies and our garments. Unlike the larvae of the Lepidoptera, beetle larvae often frequent the same situations as the adults, and are indeed often found with them. Not only so, but with what we may call the primary inhabitants of a given situation we may frequently find one or more species of predators, often both beetles and larvae of these as well as of their victims. Beetle larvae also exhibit very much greater variety of form than do Lepidopterous larvae, and generally speaking are much more difficult to rear.

**HABITAT.**—In the following brief survey I propose first to consider some of the typical situations for beetle larvae and what we may expect to find there, and then to say something about their structure and relationships, dealing however, only with those that are included in the British fauna.

1. **IN EARTH.**—Many of the *Carabidae* and *Staphylinidae* appear to wander more or less at large upon or even through the earth and are frequently turned out in digging (*Carabus*, *Pterostichus*, etc.), while others have a more definite dwelling-place. The larvae of *Cicindela*, the Tiger-beetles, construct their well-known vertical pits with open mouths in which they lie in wait for passing prey. The little mounds of tiny pellets formed by the larvae of *Nebria* may often be found in numbers on patches of bare earth in the spring. These however seem to be constructed only when the larva is full-grown and ready to pupate, the pupation chamber being about half an inch below the surface. Generally speaking, however, the predacious terricolous larvae are to be looked for under stones, pieces of wood, etc., lying upon the surface, and in the sun-cracks

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\* N. H. Joy, “A Practical Handbook of British Beetles,” 1932.

formed in the drying mud of ponds and hollows in the ground. In such situations the appearance of miniature mole-runs may reveal the presence of *Heterocerus*, *Platystethus*, or *Bledius*, and the eggs and larvae of the beetles are often to be found with them. From their haunts in the mud the beetles may sometimes be driven out by stamping heavily on the ground, or by flooding it with water, but the larvae do not appear to be so readily dislodged by these means, and the clods of earth require to be broken up and carefully searched before they are revealed.

Sandhills near the seashore have of course a special fauna of their own, and of many of these the larvae are to be found by digging in the sand, especially at the roots of plants. Where *Eurynebria* occurs the larvae are most readily discovered after a night of light rain; when the loose sand above the beach is caked on the surface with wet, the mounds of dry sand freshly thrown out by the larvae are readily seen.

The earth beneath patches of dung and carcasses should be carefully dug over for carrion feeding larvae. *Geotrupes*, *Onthophagus*, etc., carry masses of the dung in which the larvae are to feed deep into the earth, while *Copris* excavates quite a large chamber for this purpose. Carcasses on the beach above recent tide-marks are perhaps particularly productive. If a carcass can be kept under observation it will be found to shelter a regular series of inhabitants at successive stages of putrefaction and desiccation. Beneath a recently killed rabbit, for example, one may expect various species of *Necrophorus*, a few *Silpha*, *Hister*, *Staphylinidae* such as *Creophilus*, etc. As it putrifies and becomes swarming with Dipterous larvae the *Staphylinidae* become more numerous. As it dries up the carrion-feeding larvae of the first Silphid arrivals become full grown and commence to wander off and bury themselves in the earth to pupate. *Dermestidae* now make their appearance, and when nothing remains but dried skin and bones we must look out for *Trox*, *Nitidula*, *Necrobia*, and others.

2. IN WATER.—The presence of water is always an attraction. Not only is damp earth, such as the banks of ponds and streams, shingle banks in the stream bed, dried-up pools with rotten vegetable refuse, much more productive than dry earth, but in the ponds themselves, or in the streams, we find the various aquatic larvae, the *Dytiscidae* and allied families, the *Hydrophilidae*, *Dryopidae*, *Helodidae*, etc.

The *Dytiscidae* have active swimming or creeping larvae which require to come to the surface at intervals to breathe the atmospheric air, which they obtain through the pair of large spiracles at the tail end of the body. For these a waternet is the most effective means of capture, but in its absence good work can be done by hauling out masses of water-weed and searching it over a sheet or even on a

patch of bare earth. Larvae of the *Haliplidae* are to be obtained by thus searching the masses of green filamentous algae in which they feed. The peculiar *Lepisma*-like larvae of the *Helodidae*, with their silvery bodies and long, many-jointed antennae, usually prefer stagnant pools, creeping amongst rotten leaves, on water-logged sticks, and so forth, while for the scale-like larvae of *Elmis* we must search the surface of stones from the bed of a swiftly running stream. The mud at the bottom of the pond also has its denizens such as *Gyrinus* and *Berosus*, which breathe, not the atmospheric air like most aquatic larvae, but air dissolved in the water, by means of long feathery gills fringing the sides of the body (N.B.—The commonest gill-breathing larva to be dredged up is not a beetle larva but that of the Alder-fly, *Sialis*. It may be known by the large head and jaws and by the single spike at the end of the tail. *Gyrinus* has a small head and thorax, and the tail provided with paired cerci, while *Berosus* is a short dumpy larva without caudal armature.) Where the mud at the bottom is seen to be red with *Tubifex* worms, the peculiar hump-backed larva of *Pelobius* should be looked for. It is another gill-breather, but the gills are on the under surface of the abdomen and at the base of the legs. Finally if some of the reeds and other water plants be pulled up by the roots we should find attached to the latter the plump whitish larvae of *Donacia*, or perhaps the brown oval cocoons which they construct for pupation. These larvae obtain their air from the air-cells in the plant tissues, their spiracles opening at the tips of a pair of strong curved spines near the tail end of the larvae, which are driven into the plant tissues. (A similar mode of breathing is adopted by the larva of one of the gnats, *Mochlonyx*).

3. ON VEGETATION.—(a) *Free Living*. A large number of beetle larvae are of course plant feeders, e.g., the great groups of the Phytophaga and the Rhynchophora (weevils). Many of them feed in the open on the leaf surface, though some protect their bodies with a covering of some kind; others are leaf-miners, or stem- or root-borers; some form galls and others feed underground upon the roots. Of those feeding on the leaf surface mention may be made of *Lina* on poplar and aspen (particularly on young suckers), with its rows of glands down the body from which globules of moisture can be ejected on being disturbed. On poplars and willows also may be found the blackish Coccinellid-like larvae of *Phytodecta*, *Phyllo-decta*, *Lochmaea*, *Chalcoides*, etc., while the very similar larvae of *Phaedon tumidulum* often reduce the leaves of *Heraclium* to a network. Those of the other species of *Phaedon*, of *Hydrothassa* and *Prasocuris*, are often abundant on Watercress and other aquatic plants, and those of *Galerucella* on Water-dock, Purple Loosestrife, Sallow, etc. Large stretches of heather are sometimes eaten bare by the larvae of *Lochmaea suturalis*, Th. By the lane-side the plump dark green

larva of *Timarcha tenebricosa*, Fb., is frequently to be found on the Bedstraws, while the soft plump dirty brown larvae of *Chrysomela* are to be found on the leaves or in the seed heads of *Mentha* and other Labiates, *Hypericum*, etc. On *Lotus*, *Ononis* and the clovers may be found the green caterpillar-like larvae of various species of the weevil genus *Phytonomus* (*Hypera*); their characteristic cocoons of open meshwork are also spun among the leaves of the food-plant. The larvae and cocoons of *P. ruficis*, L., may be found in the same way on docks and other plants. These larvae so far mentioned all feed in the open, without protection of any sort, and probably many of them are actually distasteful to birds and other insectivores; The *Phytonomus* larvae however are probably palatable enough and are protected only by their general resemblance to their surroundings. They appear to form the favourite prey of one of the solitary wasps, *Odynerus spinipes*, which tunnels in earthy banks or the soft mortar of walls, building a projecting tubular structure formed of small pellets of earth as an approach to the nest. They are also commonly victimised by a small Ophionine Ichneumon, the banded barrel-shaped cocoon of which frequently occupies the cocoon of the host. Another group of soft-bodied larvae that feed in the open cover their bodies with a dark slimy-looking excrementitious material, that may perhaps serve a double purpose, preventing desiccation as well as affording concealment. Such larvae are those of *Lema*, that leave long yellow strips where they have been feeding on the blades of oat or wheat, while the weevils of the genus *Cionus* are generally abundant on *Scrophularia* and *Verbascum*, forming their round brown semitransparent cocoons among the seed pods of the plant. Three or four species of the genus are not infrequently to be found on the same plant. The well-known 'pear-slug' is an instance of similar nature in another group of insects, the sawflies.

Beetle larvae of groups other than the Phytophaga and Rhyngophora are also to be found wandering at large over the plants and bushes and hence to be found in the sweepnet; among these are the *Coccinellidae* or Ladybirds in search of greenfly. These are usually fairly active creatures that wander ceaselessly about in search of their prey. When fully grown they attach themselves by the tail end to the leaf and pupate in that position, several often congregating on one leaf for that purpose. As might be expected from their conspicuous colour and open mode of life the group as a whole is distasteful to insectivorous animals. A few genera, however, *Subcoccinella* and *Chilocorus*, are of shorter stouter build and have their bodies protected by rows of stiff branched spines; the former at least is vegetarian, feeding upon the leaf tissues. The somewhat similar larva of *Lagria* also often falls into the sweep net. It is not particularly active, is well protected by a coat of stiff hairs and has not the appearance of a predator, but what is its mode of livelihood I am not aware. Finally among such wanderers

at large over the vegetation are a number of predators seeking whom they may devour. Small Carabid larvae often so occur, also *Staphylinidae* of genera such as *Tachyporus*, *Stenus*, etc.

More elaborate protective coverings are constructed by certain larvae, e.g., the white waxy coat, recalling that of certain coccids, secreted by species of *Scymnus*, small Coccinellids one species of which is not uncommon on the leaves of oak trees infested with *Phylloxera*, upon which it preys. The various species of *Cassida* found on thistles, Labiates and other low plants, have their bodies furnished with a lateral row of fringed spines and a long tail fork on which is retained not only a mass of excrementitious material but also the cast skins of the earlier larval stages. This fork with its contents is held over the back of the larva in the manner of an umbrella, evidently a mode of concealment for a tasty morsel. The cryptic type of coloration of the *Cassidas* is in marked contrast to most of the *Chrysomelidae*, suggesting the edibility of this group in a generally distasteful family.

(b) *Miners*. But besides the external feeders a number of beetle larvae feed on the inner tissues of the plant. Many of them for example are leaf-miners, such as many of the *Halticidae* or Flea-beetles, the weevil genus *Orchestes*, and the Buprestid *Trachys*. Others tunnel the stem, even down to the roots of various herbaceous plants; thus many of the *Halticidae*, weevils of the *Cleoninae* in thistles, *Mecinus* in *Plantago*, some Longicornia such as *Agapanthia* also in thistles. Some of these, e.g., *Ceuthorrhynchus* and some *Apion* form swellings or galls on the plant affected. Again many species feed in the fruits or seeds of various plants; to mention a few, the well-known Nut-weevil, *Balaninus*, in hazel nuts and acorns, *Bruchidae* mainly in the seed-pods of Leguminosae and Convolvulaceae, *Gymnetron* and *Heterostomus* in *Linaria*, *Veronica*, *Gentiana*, etc., many *Apion* species also in Leguminosae, *Anthonomus* in fruits of different Rosaceae, and *Byturus* on Raspberries.

(c) *Case-dwellers*. Finally we have certain instances in which the protection for the larva is constructed by the parent beetle at the time of oviposition. Familiar examples are the rolls found on the leaves of birch, hazel and oak formed by beetles of the genera *Apoderus*, *Rhynchites* and *Attelabus*. The leaf blade is cut through to the midrib by the parent beetle and the wilted part is then formed into a roll in which the egg is laid, the midrib itself being partly severed so that the roll hangs down. These pendant rolls of withered leaf form conspicuous objects upon the birch bushes. They soon fall altogether, and development takes place on the ground, where they are likely to remain moist and soft longer than they would if left hanging on the bush. From rolls collected from the bushes I have never succeeded in rearing the beetles. *Apoderus* carries the matter a step further by tucking in the lower end of the roll to form a short stout barrel-shaped structure. These beetles seem easier to rear than *Rhynchites*.

Other case-bearing larvae are those of *Clythra* and *Cryptocephalus* in which even the egg when laid is enclosed in a coating of imbricated scales formed of faecal matter by the parent. As the young larvae grow they add fragments of leaf or stick to the case.

(d) *Root-feeders*. Not only are the more evident parts of the plant attacked but the root-feeders constitute some of the most serious pests of agriculture both at home and abroad, their presence often not being indicated until the plant attacked dies off. The *Melolonthidae* or chafers, the *Elateridae* or wire-worms (though a large number of the latter group are predacious) will at once come to mind, while *Dascillus cervinus*, L., sometimes is a serious pest of grass-land. The weevil genus *Sitona* is perhaps a more serious root pest in the larval stage than is the adult beetle to the foliage of clovers and peas of many kinds, while other weevils of the groups *Otiorrhynchinae*, *Phyllobiinae* and *Ceuthorrhynchinae* also at times cause serious damage.

(e) *Lignicolous*. Passing from herbaceous to woody plants we again find beetle larvae of many groups the cause of loss and damage, not only to growing trees but to cut timber used both in building construction and in articles of furniture. Some of these confine their ravages to the more superficial regions; such are the *Scolytidae* or bark-beetles, the weevil genus *Magdalis*, the *Pyrochroidae* and some *Buprestidae*, *Anobiidae* and Longicorns, which drive long and tortuous galleries between the bark and the solid wood. Others, such as the *Xyleborus* group of the *Scolytidae*, many *Buprestidae*, *Anobiidae* and Longicorns drive their galleries deep into the solid wood, sometimes as in the case of *Anobium*, *Lyctus* and certain genera of *Cossoninae*, reducing it to a powdery mass before they have done with it.

Some of the woodborers confine their attacks to the twigs and small branches, occasionally as in the case of *Saperda populnea*, L., on aspen and sallow, and *Cryptorrhynchus* in the latter, forming a distinct gall where the larva is at work. Many of them, in spite of their apparently protected position, have their peculiar predators; thus in the galleries of the *Scolytidae* we may find larvae of *Aulonium* with *Scolytus*, *Pityophagus*, *Rhizophagus*, *Hypophloeus*, *Thanasimus* and others with various species, as well as certain *Staphylinidae*, not to mention the Hymenopterous parasites.

Though many of these woodboring larvae tunnel in sound wood they seldom attack healthy growing trees, but sickly, diseased trees; the artificial counterpart of the latter, freshly felled trees, are very attractive to them, so that freshly cut logs may be used as bait and then destroyed. The Scolytid, *Trypodendron*, may be observed flying to and immediately boring into freshly felled beech logs; its relative *Xyleborus dispar*, Fb., with its predator *Salpingus ater*, Pk., is addicted to young birch and oak trees that have been killed by heath-fires (though it will also attack fruit-trees). Young burnt

pinces are particularly attractive to the Buprestid *Melanophila*, De G. sometimes known from its habit of alighting upon still smouldering stumps as the "fire-beetle." The stumps of felled pines are quickly invaded by the Longicorns *Crioccephalus* and *Asemum*, and older stumps are frequently riddled by the burrows of their larvae. Older, even rotten wood also has its peculiar species. Larvae of *Liopus nebulosus*, L., are plentiful beneath the bark of fallen oak boughs, while I have found *Strangalia maculata* in exposed roots so rotten as to be easily crumbled in the fingers. In partially buried and water-soaked wood the Longicorn-like larva of *Nacerda* may be found, particularly upon the sea-shore, in the groins used for beach-protection, and in the drier parts of such posts *Codiosoma spadix*, Hbst., may occur.

(f) *Fungus feeders.* If the wood be permeated by the hyphae of a fungoid growth we may look for other species such as *Dorcatoma*, *Anitys*, some of the *Melandryidae* and so on, until in the fruiting outgrowths we may get the pink larvae of *Orchesia micans* in the brown persistent woody *Polyporus* fungus that grows on tree trunks, *Boletophagus* and *Heledona* in *Fomes* and *Boletus*, *Tetratoma* in the white *Polyporus* of birch trunks, and the various species of the *Cisidae* in any of these as well as in fungus-impregnated wood. The black *Hypoxyton* fungus common on old ash trunks and birches nourishes several species of *Mycetophagus*, *Diphyllus*, *Litarigus*, etc. as well as the large Anthribid *Platyrrhinus resinosus*, Scop. (*latirostris*, Fb.). The brilliant red and black *Endomychus coccineus*, L., occurs, beetles and larvae together, in colonies on *Stereum* (?) on old stumps. *Dacne* and *Sphindus* are to be looked for in the dry powdery *Fuligo*. The earth-living fungi are also very prolific, especially in the small *Staphylinidae*, though several species have their specialities, thus in the spongy base of the Giant Puff-ball and others *Pocadius ferrugineus*, Fb., occurs, while in some of the smaller Lycoperdons and on *Scleroderma* we may find *Cryptophagus lycoperdi*, Hbst., *Lycoperdina bovistae*, Fb., and *Caenocara bovistae*, Hoff.

4. NEST DWELLERS.—The underground nests of moles and other small mammals maintain a rich beetle fauna, and of these the larvae of many occur in the same place. Many of these, until their breeding places were discovered, used to be considered some of our rarest beetles but are generally to be found when sought for in their proper habitat. Birds' nests also have their beetle inhabitants, particularly those of owls, starlings and such like species that nest in holes. The small Staphylinid, *Microglossa nidicola*, Fair., occurs often in numbers around the nesting holes of Sand-martins. Their allies, the House martins, harbour some of the débris-feeding *Ptinidae*, e.g., *Ptinus searpunctatus*, Pz., and even the exposed nests of rooks, buzzards, and no doubt many other birds are by no means unproductive of beetle life. Even the nests of other insects, the Hymenoptera, have

their peculiar species of beetles, the adults of which are seldom found outside the nests and the larvae never. Some of these are predacious upon the grubs or eggs of the Hymenoptera, while others occupy rather the position of scavengers in the nests. Thus the large and formidable Hornet harbours as a predator the large Staphylinid, *Velleius dilatatus*, Fb., while our common wasps are preyed upon by *Metoecus paradoxus*, L., and various kinds of bees by the larvae of *Meloidae*; the three species of *Antherophagus* and some of *Cryptophagus* also live in the nests of these Hymenoptera.

Ants' nests again, particularly those of certain species, have a large beetle fauna peculiar to themselves and the larvae of these in many cases are to be found nowhere else, though the adults may occasionally be taken on their passage from one nest to another. Some of these, e.g., *Lomechusa*, are predacious upon the eggs and larvae of the ants and are thus definitely harmful to their hosts, though they secrete certain fluids of which the ants are very fond, so that they are actually encouraged and cared for in the nest. Others play more the part of scavengers and are tolerated rather than welcomed by their hosts.

Of other oecologic groups probably the most numerous are those that, while not actually wood-borers, live under bark, many of them being predacious and included in the key (*infra*) to the chief wood-boring families. The household or warehouse group is another of considerable economic importance, including not only those species that attack woodwork, both structural and in the form of furniture, but also those that damage fabrics (*Anthrenus*) and our food stores, genera such as *Dermestes*, *Anobium*, *Ptinus*, *Tenebrio*, *Tribolium*, *Bruchus*, *Calandra*.

HYPERMETAMORPHOSIS.—This term is applied to the metamorphosis of an insect in which there is great change of form between successive larval instars. The best known instance, and that which has been most studied, is found in the *Meloidae*, the Oil- or Blister-beetles. The young larva on hatching from the egg is a very active little creature with long legs and jaws of a predacious type. There are no cerci though their place is taken by one or two pairs of long setae. The typical larva of this group has apparently three claws in the form of a trident on each foot, a character from which it has received the name 'triungulin.' The one object of this little larva is to reach the cell of an appropriate Hymenopteron which stores up a supply of food for its own larva. For this purpose it lies in wait on some flower-head and on the approach of the bee, or indeed of any insect, it jumps upon it and with luck is carried into the nest of the right kind of bee. It then leaves the bee for its egg while the latter is in process of being laid, and, when the cell has been closed up, with its formidable jaws it tears open the egg and devours the contents. After this it moults, but the next

stage is completely different in form. Instead of an active carabiform larva it is now almost maggot-like, of a degenerate scarabaeiform type, with feeble legs and mouthparts. It no longer has to move about but remains in the bee's cell and devours the food-mass, it may be fluid honey or more solid bee-bread or even paralyzed insects, the different genera of *Meloidae* having each their appropriate hosts in the Hymenoptera. This accomplished, it moults again, with another change of form, having now the head and appendages even more abortive than before, though the skin is now more chitinised, harder and yellower, a feature that has suggested the name pseudo-pupa or pseudo-chrysalis for this stage. As a pseudo-pupa it passes the winter, moulting in the spring to produce a form much resembling the scarabaeiform stage. It does not feed any more but soon moults again to produce the pupa. Many details in this strange life-history are as yet very imperfectly known; such, for example, as the host or hosts of our different species of *Meloë*; whether the *Meloë* larva migrates from one cell of the bee to another, and if so, how and when, for the size of the *Meloë* beetle is often such that it appears impossible for the contents of one bee-cell to have sufficed for its nourishment.

A very similar hypermetamorphosis is undergone in the allied family *Rhipiphoridae*, our *Metoecus paradoxus* behaving in a similar way in a wasp's nest. In the Strepsiptera, by some authors considered an Order distinct from the Coleoptera, but by others held to be allied to the *Rhipiphoridae*, the parasitism is carried a stage further, the carabiform or triungulin larva burrowing into the body of its host and there completing its development. Other more or less isolated cases of hypermetamorphosis have been described, e.g., the active carabiform first-stage larva of *Lebia* (*L. scapularis*) searches out a larva of *Galerucella*, then moults to a very degenerate form of larva which devours the *Galerucella* larva within its cell. (Silvestri, "Redia," II., 1904, pp. 68-84, Pl. III.-VII.)

The snail-feeding larva of *Drilus* is another instance, but in this case there is an alternation between the active, feeding form and the quiescent, hibernating form, the latter occurring twice in the life-cycle of the insect.

DEGENERATE FORMS.—It has been noticed in considering hypermetamorphosis that so long as the young Meloid larva has to fend for itself it remains an active little creature with full use of all its limbs, but once it has reached the sheltered position of the host's nursery, with a food-supply sufficient for the rest of its existence ready to hand; on moulting it assumes a degenerate form, losing the use of its limbs, and with even its mouthparts and antennae greatly reduced. The same phenomenon is found in *Lebia scapularis* and in a modified form in *Drilus*.

There are however many beetles which lay their eggs either upon

or in the food supply of the larva, so that these from the moment of hatching are in close contact with abundance of food. In such cases the legs, being no longer required for perambulation, become more or less atrophied, sometimes adapted for clinging to the food-plant rather than walking, as in many of the Phytophaga, or for burrowing to a limited extent in the earth, as in the root-feeding *Scarabaeidae*, or for slight movements, by purchase upon the walls of their chambers, as in the dung-feeding *Scarabaeidae* or the various wood-boring and mining larvae. In the case of the wood-boring *Cerambycidae* we find that the legs are so far reduced as to be useless even for this purpose, their place being taken by ambulacral pads on the dorsal and ventral surfaces of the body segments, that can be forced outwards by blood pressure against the walls of the tunnel to give the necessary purchase. A similar end is achieved in Anobiid larvae and in many weevil larvae by stiff hairs or spinules on the surface of the skin, in conjunction with a swelling passing in a wave-like manner along the body.

Another group of degenerate larvae living a protected life is found in these species mentioned above that live in nests, particularly in Ants' nests. Many of these of course are predators and actively seek their prey in the nests, for this purpose requiring complete freedom of movement for attack, but others are not only carried about by ants but even fed by them so that they have lost even the ability to feed themselves. (Donisthorpe "Guests of British Ants," 1927.)

From these remarks it will I think be apparent what a wide variety there is not only in the mode of life of beetle larvae, but also in their form, the latter of course being to a large extent consequent upon the former.

Read 11th May, 1933.

### HISTORICAL.

Though a number of isolated life-histories of different species of beetles had been written the first attempt to figure generally the larvae of the different families seems to have been made by Westwood in "The Introduction to the Modern Classification of Insects," 1839. Erichson, in "Wiegmann's Archives," 1841-42, was the first to produce a general survey of beetle larvae, while in 1853 Chapuis and Candèze produced their "Catalogue des Larves des Coleoptères." A great step forward was made by Schioedte in a series of papers in the "Naturh. Tidsskrift," 1861-83, in illustrating his work with beautifully executed figures with a great wealth of detail, figures that are scarcely surpassed by the best

modern work. His figures have been freely reproduced by Ganglbauer, Reitter and Kuhn, and in this form are familiar to most of us; the last mentioned also gives numerous original figures. Perris' "Larves des Coleoptères de France," 1877, was unfortunately incomplete, large groups, such as the Adepnaga, the *Chrysomelidae*, and the Rhynchophora being omitted altogether.

A most useful catalogue of the literature dealing with the subject, so far at least as regards the European fauna, was published by Rupertsberger in 1880, with a supplement in 1894. Since that time until the appearance last year of Boving and Craighead's "Synopsis of the Principal Larval Forms of the Order Coleoptera," no work dealing with the larvae of Beetles generally had appeared, though much useful work had been done, not only in the description of many individual forms but more particularly in the more general treatment of the larvae of different families and groups of beetles.

Among those of most use to the student of British beetles may be mentioned:—

*Carabidae* by Van Emden, "Suppl. Ent." 1919.

*Dytiscidae*, etc. by Berland, "Encycl. Ent." X., 1927.

*Hydrophilidae* by d'Orchymont, "Ann. Biol. Lacustr." VI., 1913.

*Staphylinidae*, Verhoeff, "Arch. Naturgesch." 85, 1920.

Kemner, "Ent. Tidskr." 46, 1925.

*Clavicornia*, Verhoeff, "Arch. Naturg." 89, 1923.

*Elateridae*, Henriksen, "Ent. Meddel." (2)III.

*Cantharidae*, Verhoeff, "Arch. Naturg." 83, 1919—89, 1923.

*Chrysomelidae*, Paterson, "Proc. Zool. Soc., Lond." 1931.

## CLASSIFICATION OF BEETLE LARVAE.

The Coleoptera or Beetles come into the category of Insects with complete metamorphosis, *i.e.*, with a grub-like larval state during which the insect feeds and grows, followed by a non-feeding, resting, pupal stage, in which the wing rudiments of the adult first become visible. In the insects with incomplete metamorphosis, on the other hand, the young insect or nymph has, except for the lack of wings, very much the form and habits of the adult. The wings first become visible as outgrowths from the posterior lateral angles of the meso- and metathorax, and increase gradually in size through several moults until the adult stage is reached without any intervening resting stage.

It may now be well to consider briefly the characters of a beetle larva and how it differs from the larvae of other insects with complete metamorphosis.

### *General Characters of Beetle Larvae.*

Head distinct, with curved biting mandibles which meet or cross when at rest (except *Melasidae*, *Lycidae*), three pairs of thoracic legs

(sometimes reduced or even absent); tarsus, if distinct, not more than single jointed; abdominal segments without paired ventral prolegs, though a single terminal pseudo-pod is often present; paired subterminal cerci present or absent, but no paired terminal hooks.

The chief points in which they differ from the larvae of other orders may be expressed in the following key:—

- KEY TO THE LARVAE OF INSECTS WITH COMPLETE METAMORPHOSIS.
1. (2) No distinct head-capsule; mandibles hook-like, non-opposable.  
DIPTERA  
(Cyclorrhapha)
  2. (1) Head distinct.
  3. (8) Thoracic legs wanting.
  4. (7) Head capsule and its appendages well developed.
  5. (6) Antennae single jointed; labium without palps.  
DIPTERA  
(Nematocera, Orthorrhapha)
  6. (5) Antenna usually 3-jointed; labial palpi present.  
COLEOPTERA  
(Curculionidae, some Cerambycidae, etc.)
  7. (4) Head capsule and appendages imperfect; larvae living in cells constructed by the parents, or parasitic.  
HYMENOPTERA  
(Aculeata, Parasitica)
  8. (3) Three pairs of thoracic legs (sometimes reduced).
  9. (14) Paired prolegs on some at least of the abdominal segments.
  10. (11) Prolegs (2 to 5 pairs) crowned with hooks (wanting on 1st and 2nd and on 7th and 8th segments).  
LEPIDOPTERA
  11. (10) Prolegs (6 or more pairs) without hooks (wanting in Siricidae).
  12. (13) One ocellus only on each side of head; labrum emarginate in middle; phytophagous. TENTHREDINOIDEA
  13. (12) Eyes compound or multi-ocellate; labrum not emarginate; predacious (except *Boreus*) MECOPTERA
  14. (9) No paired abdominal prolegs.
  15. (16) Pair of terminal grasping hooks; larva aquatic, living in portable case or fixed web. TRICHOPTERA
  16. (15) No terminal pair of hooks.
  17. (18) Mandibles slender, suctorial, non-opposable.  
NEUROPTERA
  18. (17) Mandibles stout, curved and opposable.
  19. (20) Labial palpi 3-jointed; tarsi distinct with 2 claws.  
MEGALOPTERA
  20. (19) Labial palpi 2-jointed; tarsi distinct or not.  
COLEOPTERA

## STRUCTURE.

Head distinct, usually free, but sometimes (*Lampyridae*, *Cerambycidae*, etc.), more or less sunk into the prothorax; either rounded with the mouth facing downwards (hypognathous, *i.e.* with the underside of the head very short), or more or less flattened, the underside of the head well developed and the mouth directed forwards (prognathous or epignathous). There is usually a group of from one to six eye-spots or ocelli on each side, behind the base of the mandible, also a normally three-jointed antenna above the base of the mandible. From the medial side of the antenna a suture runs obliquely backwards to the neck or occipital opening. Usually these sutures meet before reaching the base of the head to form a single median suture and cutting off in front a triangular piece, the fronto-clypeus; sometimes however they remain separate throughout; the side pieces of the head are sometimes called the parietals. At an ecdysis the head capsule splits along these sutures to facilitate the withdrawal of the head of the next instar. On the underside of the head is a similar pair of sutures, the gular sutures, which again may unite along the median line, or may remain separate either enclosing a median gular piece, or leaving the head capsule incomplete. The mandibles are usually strong and curved, of various types according to the nature of the food taken. The predaceous type is generally rather slender, strongly curved, sharp pointed and the tips crossing or inter-locking when closed, often provided with an accessory tooth, the retinaculum, on its inner edge; the retinaculum and the free, pointed apex are sometimes serrate to give a better hold on struggling prey. Sometimes when only fluid juices of the prey are swallowed, as in the *Dytiscidae*, *Telephoridae*, etc., the simple curved mandible is hollow or grooved, the groove in such a case being supplemented by the close application of the maxilla or its palp to complete the tube. Frequently also the base of the mandible is expanded and roughened or grooved to form with its fellow of the other jaw a grinding or crushing apparatus; this expansion is called the mola. The phytophagous type of mandible is shorter and stouter, with the mola well developed; sometimes the inner edge is sharpened to form a cutting or shearing instrument, as in some *Elateridae*, but usually the cutting is done by the broad rounded apices, which meet when closed much like the jaws of a pair of pincers. With the phytophagous type of mandible the labrum is usually free and well developed, but with the predaceous type it is generally reduced or fused with the clypeus or even absent altogether. The maxillae and labium may be either attached to the front border of the underside of the head, between and on a level with the bases of the mandible (prognathous type), or may be deeply sunk in an excavation between the two side pieces of the head (hypognathous type).

Behind the head are normally 13 body segments, the first three

of which (the thoracic segments) are usually provided each with a pair of legs, often so much reduced as to be useless for walking, and in the weevils and one or two other groups absent altogether. Each leg consists normally of coxa, trochanter, femur, tibia, and tarsus, or the two latter forming a single claw-like tibio-tarsus. Only in the Adephaga is the tarsus present as a distinct joint separate from the tibia, and in this group there are generally two claws. The abdominal segments are destitute of legs, though structures functioning as prolegs are found on the ventral surface of the exposed larvae of *Hypera* and *Cionus*; occasionally there are lateral or sublateral outgrowths as gills in some aquatic larvae, or lateral prolongations of the body-plates. The anus is terminal or subterminal and is frequently used as a pseudopod, the last segment sometimes becoming a tubular prop for that purpose. A pair of penultimate cerci, simple or jointed, is often present; sometimes these are freely movable, sometimes firmly fused with the dorsal plate of the 9th segment. In other cases the dorsal plate of the 9th abdominal segment is produced into a pair of lobes or processes, "pseudocerci," somewhat resembling cerci of the fused type. Chitinous plates are frequently developed in the membrane of the segments. Sometimes these form solid plates covering the whole dorsal surface of the segment, sometimes even dorsal, lateral and ventral plates unite to form an unbroken ring, but usually dorsal and ventral plates remain distinct and separated by a series of small lateral plates. The dorsal plates moreover are usually divided down the middle line, at least on the thoracic segments, this suture forming a line of fissure at the time of ecdysis. Very frequently the plates remain small and isolated, serving perhaps as a point of insertion for a seta or group of setae, and they may even be absent altogether.

The body is not infrequently clothed with setae, usually isolated but sometimes combined in groups which may take the form of tubercles (many *Coccinellidae*, *Phytophaga*), or even be drawn out into setigerous or compound spines (many *Coccinellidae*). The setae are usually simple but occasionally clavate or barbed (*Dermestidae*).

Air is supplied to the tissues by means of tracheae which normally open to the atmosphere by spiracles. Of these there are usually nine pairs, the first pair one on each side of the pro-thorax, or frequently in the membrane between pro- and mesothorax, or even shifted on to the mesothorax; the others on each side of the first eight abdominal segments, sometimes in the membrane between the body plates but not infrequently on the sides of the dorsal plates. When the spiracles are fully developed respiration is said to be peripneustic. In most aquatic larvae however the spiracles, with the exception of the last pair, are incomplete and functionless; the last pair in this case are enlarged and placed terminally, either

owing to the reduction of the ninth segment or to their transference to this segment (metapneustic respiration as in *Dytiscidae*, *Donacia*, etc.). In other aquatic larvae the spiracles are altogether suppressed, their function being performed by gills (Respiration amphipneustic as in *Gyrinidae*, *Pelobiidae*, etc.). Occasionally in aquatic larvae we find cases where the necessary transfusion of gases appears to take place through the thin skin of the body itself without either spiracles or gills (apneustic respiration).

The spiracles themselves take various forms, the simplest being annular or ringlike, with a single round opening. The *biforous* type has two elongate openings side by side, while the *cribriform* type has many small openings forming a sort of perforated plate.

Many different types of beetle larvae may be recognised, types that to some extent are of classificatory value, although since they have evolved as adaptations to the various environments of the larvae, the same type of larva may have arisen in quite unrelated groups of beetles. But these types are by no means well defined, and exhibit all stages of intermediate forms.

Some of the more prevalent may perhaps be mentioned :—

*Carabiform.* Elongate, slender, active, with well developed legs and a terminal pseudopod; cerci usually present; usually fairly well armoured and predacious. (*e.g.*, *Carabidae*, *Staphylinidae*.)

*Campodeiform.* Similar to the last, but whitish and feebly armoured (smaller *Staphylinidae*.)

*Fusiform.* Shorter and more compact, tapering towards each end, cerci usually wanting, frequently hairy or bristly. (*Coccinellidae*.)

*Onisciform.* Woodlouse-like; depressed, more or less oval. (Many *Silpha*, *Helodes*, etc.)

*Elateriform.* Elongate, subcylindrical or depressed, with segmental constrictions scarcely marked; well armoured, of a yellow or brown colour. (*Elateridae*, *Tenebrionidae*, etc.)

*Clavicorn.* Similar to last but less well armoured; last body segment ending in a pair of upturned spines. (*Nitidulidae*, etc.)

*Eruciform.* Caterpillar-like; subcylindrical, soft-bodied; cerci wanting. (*Hypera*.)

*Cerambyciform.* Elongate, soft, woodborer; legs reduced or absent. (*Cerambycidae*.)

*Scarabaeiform.* Body soft and curved ventrally, legs feeble; segments often transversely plicate. (*Scarabaeidae*, *Curculionidae*, etc.)

In working with coleopterous larvae it very quickly becomes evident that the classification of the larvae does not coincide in details with the classifications founded upon the adults. This is

due of course to two main causes, first, our classifications founded upon the adults are not perfect, but require adjustment in various details, adjustments that will be facilitated in no small measure by taking into account the biology of the groups; and secondly on the fact that while evolution has been acting upon the race in the adult stage, it has also been acting, often quite independently, upon the earlier stages. To quote one or two instances: the larvae of *Hydraena* and *Ochthebius* differ very widely from those of the *Hydrophilidae*, in which family we have been accustomed to place them, and agree much better with those of one section of the *Staphylinidae*. In the latter family, too, we find that the larvae fall fairly definitely into two groups, one of which, the *Staphylininae*, according to our usual classification, divides the other into two sections. The Clavicornia of older authors, again are generally recognised as being a heterogeneous assemblage, and larval characters fully bear this out; and the same remark applies to the Heteromera, most of which indeed are scarcely separable from the Clavicornia.

Very noticeable among students of the larval stages of beetles is the tendency to erect new families for genera or groups of genera whose larvae have a facies of their own. But to my mind this inclination to base systematics upon larval characters should be indulged in with the utmost caution. While fully admitting that larval characters may afford invaluable data from the systematic standpoint, and indeed must be taken into consideration if we are to attain anything like a perfect system, yet they require to be taken only in conjunction with all the other factors that go to make up the entity of a species, *i.e.*, characters of the adult, both external and internal, development characters and even behaviouristic characters, any or all of which may give valuable clues to the true relationships of the group, whether species or family, that we are considering, but upon none of which by themselves can we rely if we are to reach a just conclusion.

Evolution is one of the fundamental bases of modern biological science, and one of the aims of a scientific classification should be to express as nearly as may be the relationships of one group to another, the minor groups to one another within the major groups; thus genera within the families, families within the order, and so on. The actual classification, the end-result of evolution, is there spread out before us; the task of the systematist is to find the clues to the proper association of the different groups, to pick out from among the multiplicity of characters presented to us those that are of proper successive importance, and valuable hints are frequently to be found in characters that are so obscure or so minute that one would not at first dream of considering them of major importance. Such characters may be found, say, in the wing venation of beetles, in the type of genital armature, or even in internal characters such

as the number of Malpighian tubules, and so forth, but once the clue has been grasped one can more readily weigh the value of the more obvious characters, and so arrive at a truly natural classification reflecting in some degree the evolutionary history of the group. Such a classification may perhaps be compared with a jigsaw puzzle. One is able to join pieces together, here and there, subsequently fitting these blocks together, until we get the outline of the picture as a whole, only perhaps to find that a number of pieces with nothing but, say, blue sky are left, which may apparently go anywhere, and which require infinite patience before each can be fitted into its proper place.

Such at any rate is roughly my idea of a scientific scheme of classification. It is not a system that was 'invented' a couple of hundred years or so ago, as we were told the other night, and that our so-called scientists have blindly followed ever since. It is true that the foundations of the modern system were laid about that time, by workers who were handicapped by having only one factor, the adult insect, available for consideration, but that system has been hammered at, revised and improved by one worker after another, looking at the problem now from this angle, now from that, taking one factor after another, wing venation, genitalia, metamorphosis, and so on, until we have now some prospect of reaching a satisfactory system.

Various attempts have been made to construct a key by means of which any given larva may be run down to its appropriate family, but owing on the one hand to the highly diverse forms assumed by beetle larvae even within the same family and on the other to the similarity of form and habit in families not at all closely related this is by no means a simple matter, relatively great importance having to be attached to minute points of structural detail that have persisted through having escaped being seized upon as a varying factor in evolution, while more obvious characters in form and mode of life are disregarded as having little value from an evolutionary standpoint.

In the following pages an attempt is made at a classification of the larvae of the British beetles according to their habitat and more obvious characters, avoiding as far as possible the use of characters which necessitate dissection and the making of mounted preparations, its object being to enable the beginner to recognise at least to what group of beetles any larva he may find may belong. It makes no claim to be a complete key to the families; for such a key the more advanced student is referred to one of those already existing, *e.g.*,

- MacGillivray, A. D., 1903, "A Table of the Families of Coleopterous Larvae." "N.Y. State Mus. Bull." 68, Ent. 18, pp. 288-294.  
 Rymer Roberts, A. W., 1930, "A Key to the Principal Families of Coleoptera in the Larval Stage." Bull. Ent. Research, XXI, pp. 57-72.

Boving, A. G., and Craighead, F. C., 1931, "An Illustrated Synopsis of the Principal Larval Forms of the Order Coleoptera." *Entomologica Americana*, pp. 1-86 and 125 Plates.

A few of the more populous habitats are taken, and their more usual inhabitants arranged in the form of keys running down to the families. Other more or less specialised habitats with less varied population have been referred to above and the more likely genera to be found in them indicated. The keys given for the major groups will be of use in separating the families here also.

I. *On or in Earth, beneath Carrion, etc.*

1. (28) Body straight, elongate (mainly predacious, exc. some *Elateridae.*)
2. (23) Mouth directed forwards, labrum absent.
3. (6) Tarsal joint distinct, usually with 2 movable claws.
4. (5) Larva in vertical burrow in earth; body, except head and prothorax, soft; 5th abdominal segment with dorsal hump; cerci wanting *Cicindelidae.*
5. (4) Larva free and active, body segments usually with larger or smaller dorsal and ventral plates; cerci usually jointed and movable (sometimes fixed). *Carabidae.*
6. (3) Tarsus as simple claw at end of tibia.
7. (12) Cerci present.
8. (9) Spiracles annular, mandibles simple, cerci 3-jointed. *Staphylininae.*
9. (8) Spiracles biforous; mandible with retinaculum.
10. (11) Ocelli usually 6 on each side; cerci long, 3-jointed; apex of mandible serrated. *Helophorus.*
11. (10) Ocelli 1 or 0 on each side; cerci 2-jointed; apex of mandible smooth. *Histeridae.*
12. (7) Cerci wanting.
13. (14) Body bristly; snail-feeders. *Drilidae.*
14. (13) Body smooth.
15. (22) Body leathery or velvety, dull; mandible channelled.
16. (21) 9th abdominal segment unarmed.
17. (20) Head retractile beneath pronotum.
18. (19) Body leathery, with terminal protrusible brush; snail-feeders. *Lampyridae.*
19. (18) Body without terminal brush; mandibles fine, split to base. *Lycidae.*
20. (17) Head not retractile; body soft and velvety. *Cantharidae.*
21. (16) 9th segment with dorsal shield ending in two upturned points (often in rotten wood). *Malachiidae, Dasytidae.*
22. (15) Body smooth and shining, yellow or brown; 9th segment subconical or depressed and ending in one or paired points; mentum and bases of maxillae form a firm plate which is sunk in a deep emargination of the underside of the head. *Elateridae.*

23. (2) Mouth directed more or less downwards; labrum well developed.
24. (25) Cerci present. *Staphylinidae, Silphidae.*
25. (24) Cerci absent.
26. (27) Body as in *Elateridae* but ventral mouthparts free. *Tenebrionidae.*
27. (26) Body softer, segmental constrictions well-marked; no median frontal suture; burrows in wet mud. *Heteroceridae.*
28. (1) Body curved ventrally; root or dung feeders.
29. (32) Head capsule complete beneath behind mouth cavity; body firmer, segmental constrictions feeble.
30. (31) Spiracles biforous; median frontal suture present. *Byrrhidae.*
31. (30) Spiracles cribriform; frontal suture absent. *Dascillidae.*
32. (29) Head capsule incomplete beneath; body soft, transversely wrinkled.
33. (34) Legs developed; size medium or large. *Scarabaeidae.*
34. (33) Legs wanting; size small to medium. *Curculionidae.*

## II. *Aquatic Forms.*

1. (10) Labrum wanting; mouth directed forwards.
2. (9) Tarsus distinct, with 2 (sometimes 1) claws.
3. (6) Abdomen of 8 segments; swimming forms.
4. (5) Respiration metapneustic (by pair of terminal spiracles). *Dytiscidae.*
5. (4) Respiration amphipneustic (by ventral gills). *Pelobiidae.*
6. (3) Abdomen of 10 segments, creeping forms.
7. (8) Gills absent; 10th segment long, bifid at apex; tarsus with single claw. *Halipidae.*
8. (7) Long leaf-like lateral gills present; 10th segment armed with 4 hooks; tarsus with 2 claws. *Gyrinidae.*
9. (2) Tarsus forming a simple claw-like joint at end of tibia; abdomen of 8 segments; respiration usually metapneustic with terminal pocket (occasionally amphipneustic). *Hydrophilidae.*
10. (1) Labrum present; mouth directed more or less downwards.
11. (14) Creeping forms; head capsule complete behind mouth cavity.
12. (13) Antennae very long and slender, many jointed; respiration by gills in terminal pocket; onisciform. *Helodidae.*
13. (12) Antennae normal; form elongate to onisciform. *Elmidae, Dryopidae.*
14. (11) Form plump, whitish, on roots of water-plants, into which a pair of spiracles on curved spines near end of abdomen are plunged. *Donaciinae.*

III. *On Vegetation.*

1. (20) Free living forms.
2. (7) Body protected with a covering.
3. (6) Covering black and slimy.
4. (5) Legs present. *Crioceris, Lema.*
5. (4) Legs absent. *Curculionidae (Cionus, Phytobius).*
6. (3) Covering whitish, waxy; size small. *Scymnus.*
7. (2) Body unprotected.
8. (19) Legs present.
9. (12) Body short, fusiform, with branched processes.
10. (11) Flattened oval, with lateral fringe of processes; caudal prong with cast skins, excrement, etc., held over back. *Cassida.*
11. (10) Convex, with dorsal as well as lateral branched spines. *Coccinellidae (Subcoccinella, Chilocorus).*
12. (9) Body without branched processes.
13. (16) Body short, fusiform.
14. (15) Larva active, predacious; legs rather long; head capsule complete beneath behind mouth cavity. *Coccinellidae (most).*
15. (14) Larva sluggish, often gregarious, feeding on the leaf substance. *Chrysomelidae (most).*
16. (13) Larva elongate, parallel, with pair of caudal spines.
17. (18) Larva blackish, clothed with erect hairs. *Lagriidae.*
18. (17) Larva pale yellowish; in fruits of *Rubus*. *Byturidae.*
19. (8) Legs absent, body green, caterpillar-like, on Leguminosae and other low plants. *Phytonomus (Hypera).*
20. (1) Leaf-miners, feeders in flower buds and seed-heads and rolled leaves, gall-makers, etc.
21. (26, 31) Leaf miners.
22. (23) Legs present. *Chrysomelidae, (Orsodacne, Zeugophora and many Halticinae).*
23. (22) Legs wanting.
24. (25) Body tapering behind prothorax; head elongate, deeply sunk in prothorax. *Buprestidae (Trachys).*
25. (24) Body subparallel; head round. *Curculionidae (Orchestes).*
26. (21, 31) In flower buds and seed heads.
27. (28) Legs well developed (in flower heads). *Nitidulidae, (Heterostomus, Cercus, Brachypterus, Pria, Meligethes).*
28. (27) Legs absent or minute.
29. (30) Legs absent; anal segment with 4 lobes. *Curculionidae, Monomychus (Apion, Orobitis, Gymnetrion, Anthonomus, etc.)*
30. (29) Legs minute: anal segment with transverse fold only. Mainly in seeds of Leguminosae and Convolvulaceae. *Bruchidae.*

31. (21, 26) Gall makers, legs absent or minute.
32. (33) Body stout, curved ventrally.  
*Curculionidae.*
33. (32) Body elongate, straight; galls in stem of Aspen, Salix.  
*Longicornia (Saperda).*
34. (21) In rolled leaves.  
*Curculionidae,*  
(*Attelabus, Rhynchites, etc.*).
- IV. *Wood-borers.* (N.B.—Many Coleopterous larvae are predatory upon the wood-borers and found in the same burrows; these are therefore noted with the appropriate group of wood-borers, appearing as well in many cases as separate items).
1. (24) Body straight.
2. (11) Legs absent or vestigial.
3. (10) Labrum present, mouth-parts normal.
4. (7) Head free; legs present but small.
5. (6) Dorsal and ventral scansorial pads present.  
*Lepturinae (pred. Elateridae).*
6. (5) Ventral scansorial pads wanting.  
*Mordellidae (exc. Anaspis).*
7. (4) Head partly retracted into prothorax.
8. (9) Prothorax enlarged; spiracles cribriform.  
*Buprestidae.*
9. (8) Body subparallel; dorsal and ventral scansorial pads present.  
*Cerambycidae (pred. Elateridae).*
10. (3) Labrum and mouth-parts reduced, apices of mandibles divergent.  
*Melasidae.*
11. (2) Legs well developed; head free.
12. (23) Forms not unusually slender; head capsule complete ventrally behind mouth cavity.
13. (14) Labrum absent.
- 13a. (13b) Body well chitinised, not constricted between segments, last segment either subconical or depressed, with median or paired processes; ventral mouthparts forming a firm plate received into an excavation of the underside of the head.  
*Elateridae.*
- 13b. (13a) Body soft, hairy; 9th segment with dorsal plate ending in two spines.  
*Cleridae.*
14. (13) Labrum distinct; ventral mouthparts free and prominent.
15. (20) Body well chitinised, much as in *Elateridae*; spiracles annular.
16. (17) Body convex, subcylindrical; last abdominal segment variable, simple, depressed or with pair of upturned spines.  
*Tenebrionidae.*  
*Cistelidae.*
17. (16) Body strongly depressed; 9th abdominal segment terminating in pair of backwardly directed spines.

18. (19) 8th segment as long as 6th and 7th together.  
*Pyrochroidae.*
19. (18) 8th segment not elongate.  
*Pythidae, Nitidulidae, etc.*
20. (15) Body softer, more resembling *Cerambycidae*.
21. (22) Mola well developed. *Oedemeridae.*
22. (21) Mola not developed. *Melandryidae.*
23. (12) Body very slender; head capsule incomplete beneath.  
*Lymexylonidae.*
24. (1) Body soft, curved ventrally.
25. (26) Size large; head free. antennae long; anal opening longitudinal; 2nd and 3rd pair of legs form stridulatory apparatus.  
*Lucanidae*  
(pred. *Ludius* on *Dorcus*).
26. (25) Size small; antennae very small.
27. (32) Legs present.
28. (29) Head free; body segments with minute spinules.  
*Anobiidae* (pred. *Cleridae*).
29. (28) Head more or less sunk in prothorax.
30. (31) Spiracles subequal *Bostrychidae.*
31. (30) 8th pair of abdominal spiracles very large.  
*Lycidae.*
32. (27) Legs absent. *Curculionidae, Scolytidae.*  
(pred. *Colydiidae, Nitidulidae, Tenebrionidae, Pythidae, etc.*)

It is the object of this brief survey of the larvae of the British Coleoptera to be helpful not only to the coleopterist in encouraging him to take an interest in the early stages of his favourite group, but also to the non-coleopterist, whose interest in his casual finds is, it is to be feared, not infrequently strangled at birth by the apparent difficulty in identifying however roughly his captures. Indeed the variety of structure in beetle larvae is so great compared with that of Lepidopterous larvae, for example, that it is generally speaking easier to recognise family characters in them, though the lack of colour and markings makes the recognition of species difficult. With a Lepidopterous larva on the other hand the family characters are apt to be overwhelmed by the specific characters, so that apart from chance resemblances to some known larvae it is often difficult to determine in what genus or even family to place it. Yet there remain very many genera of our British Coleoptera of which the larva is still unknown, while their study from the specific standpoint has hardly commenced, and if this paper should induce any of our members to take up their study I can assure him that it is one that not only will amply repay him in interest for the time devoted to it, but offers good prospects of making new discoveries and thus adding a notable link to the chain of our knowledge.

## Gall Midges and their Galls.

By M. NIBLETT. — Read 25th May, 1933.

The Gall Midges or *Cecidomyiidae* are a family of small fragile flies, with a world-wide distribution. There are about 2,500 species known, with some 330 genera, a large percentage of which are monotypic. They have been monographed by Kieffer in "Genera Insectorum"; and numerous papers on individual species, or genera, have been published both in this country and abroad. Many species of economic importance have been closely studied, but of the others, there are a very great number whose life-histories are practically unknown.

The larvae of these insects may be roughly divided into three groups.

1. Zoophagous species, a few of which are true parasites; many of this section are predaceous, preying upon Aphides, Mites, Dipterous larvae and pupae, including those of other *Cecidomyiidae*.

2. Saprophagous species, which live among excrement of other insects, and amongst decaying vegetable matter.

3. Phytophagous species, which may be divided into two sections: (a) Those living on, or within, various parts of plants without causing any gall-formation; and (b) the true Cecidogenous or gall-causing species.

A very big percentage of these flies belong to the last section and are the cause of gall structures upon leaves, flower and leaf buds, stems, fruit, and in a few instances the roots.

Their larvae are small, rather narrowed at both extremities, with the head very small; they have thirteen body segments, and their most characteristic feature is the so-called "breast-bone," or sternal spatula, this is a chitinous plate varying in shape and size, which is situated about the middle of the thoracic section.

Numerous theories have been put forward suggesting the use made of it by the larva; these I will not attempt to deal with as, so far as I know, no one theory has been definitely accepted. Many of the larvae have the power of leaping, they do this by curving themselves into a loop, and then suddenly releasing the tension, and by this means they may project themselves to a distance of several inches. In colour the larvae vary considerably, they may be white, yellow, orange, red, or varying shades between these

colours; there is also not infrequently a change of colour between their early stages and when they are full grown, which at times is rather misleading; exposure to light also seems to affect their colour to a certain extent.

Two methods of pupation occur with these insects. Usually the pupa is enclosed in a cocoon which is either single or double; but with some the larval skin is not moulted, although separated from the pupa. Pupation may take place either in the part of the plant where the larva has been feeding, or the larva may enter the earth and undergo its transformation there.

The larvae and sometimes the pupae are preyed upon by parasitic larvae of Chalcids and Proctotrupids, and also by predaceous larvae of certain species of *Cecidomyiidae*.

The adult insect is small and fragile, has very long legs; long, many-jointed antennae which are frequently ornamented with whorls of hairs; the wings have few longitudinal veins and the cross-veins are often wanting. They vary considerably in colour, yellow to red predominating, while brown to smoky black is not uncommon.

Reproduction is almost entirely by means of fertilized eggs, and the female cecid may be distinguished by its pointed abdomen. I do not know of any parthenogenetic reproduction occurring in the *Cecidomyiidae*, but paedogenesis is known to occur in two genera, *Miastor* and *Oligarces*, the larvae producing larvae for several generations, after which a generation of larvae will pupate and produce adult flies in the normal manner.

The most profitable method of collecting these tiny creatures is to breed them from the galls, or parts of the plants in which the larvae feed. This method has several advantages.

Firstly, if we open the galls and expose the larvae, we can see their colour, and whether they live singly or gregariously.

Secondly, we can observe where they pupate.

Thirdly, one becomes familiar with the position which they occupy in the plant.

And finally, we can find out the time of year in which the imagines emerge.

These insects are not very difficult to rear, a number of small jars with covers, containing an inch or so of sterilized earth or sand, which must be kept damp, kept somewhere preferably where the temperature is as near that of the outside atmosphere as possible, is all the equipment that is necessary; mildew is somewhat of a bugbear, but is not such a serious trouble as one might think. Of course one must be prepared for numerous disappointments, but the majority of the *Cecidomyiidae* whose larvae pupate in the earth, are not very difficult to rear; it is those which pupate in the galls that offer the greatest difficulties. I have been trying to rear the flies from two species which pupate in the galls for the past five years without success, but these are rather exceptions.

One point of considerable interest in connection with these insects is the fact, that certain genera are confined entirely to one family of plants, or to a certain group; as examples we may take the genus *Iteomyia* found only upon *Salix* spp.; and *Rhabdophaga* with twenty species also confined to *Salix*; *Majetiola* with about ten species, all found upon grasses: *Cystiphora* is confined to certain species of the Compositae; the genus *Hormomyia* affects sedges; while *Harmandia* is only found upon *Populus tremula*, L. The genus *Clinodiplosis* contains a number of inquiline species, of which we may take as examples, *C. gallicola*. Rübs., with yellow-red larvae in the galls of *Andricus fecundatrix*, Htg., *C. urticae*, Kieff., with pale orange-yellow larvae in galls of *Perrisia urticae*, Perris, and *C. botularia*, Winn., in the galls of *Perrisia fraxini*, Kieff.; this latter species, known as *Diplosis botularia*, Winn., was mistaken for the gall-causing midge for many years.

*Taxomyia taxi*, Inch., causes the leaves of Yew (*Taxus baccata*, L.) to bunch up into a cone; the larvae of this species are red and pupate in the gall; sometime in May the pupa works its way out of the gall, and also out of its puparium, and lies naked for a short time before the red-bodied midge emerges. The galls are to be found in the autumn, but it is not advisable to gather them until the end of April, or early in May, if one wishes to breed out the midge.

*Lasioptera rubi*, Heeger, causes woody swelling upon the stems of Brambles (*Rubus* spp.), in which numerous white larvae live, these pupate in the gall, the midges emerging in April, May, and June.

The genus *Perrisia* which is gradually being split up, contains a large number of species, which inhabit many species of plants, and are the cause of galls upon almost every part of the plant.

*Perrisia bryonicae*, Bouché, is the cause of an irregular terminal rosette upon *Bryonia dioica*, Jacq. (White Bryony), the larvae are white, gregarious, and may be found in the galls from June to September; from galls I collected in August the midges emerged in the following May; I think it is probable that this species is double-brooded.

*Perrisia affinis*, Kieff., causes fleshy rolls on the margins of the leaves of several species of *Viola*, these rolls often have a purplish tinge. The larvae are white to pale-orange and are gregarious. The galls may be found in August, September, and October; from October galls I have had the midges emerge in the following May and June.

*Perrisia rosarum*, Hardy, causes the leaflets of various species of *Rosa* to fold over in the form of a pod, the larvae are yellow, and may be found in the galls from July to September, the midges emerging in the following May. The galls frequently contain the white larvae of an inquiline species; I have found these in varying numbers, sometimes only one or two, sometimes as many as sixteen

in a gall; and it always appeared that each variety of the larvae kept to one portion of the gall, not mixing indiscriminately. On several occasions I observed an inquiline larva with a parasitic larva attached to it externally. These inquiline midges also emerged in May, both species pupating in the earth.

*Perrisia trifolii*, F.Loew., causes the leaflets of *Trifolium* spp., to fold into a pod; the larvae are yellow and pupate in the galls. Galls found in July with pupae in them gave the midges in August. I have also found the galls with white Cecid larvae in them, probably those of the inquiline *Tricholaba trifolii*, Rübs.

*Perrisia urticae*, Perris, the galls of this species are to be found upon leaf, stem, and flower-stalk of the common nettle (*Urtica dioica*, L.), from early June to November; the larvae are white and live singly in the galls, they pupate in the earth and must have, I feel sure, several broods in a year. From galls collected on 2nd August, the larvae left the galls and pupated by 4th September, the midges emerging from 12th to 15th September, but from other galls taken in August, as also from October ones, they did not emerge until May of the following year. In one of these October galls I found a deep orange-coloured Cecid larva with a white egg attached to it.

*Jaapiella veronicae*, Vallot, causes terminal galls of folded leaves upon various species of *Veronica*, which are more or less pilose, according to the pilosity of the leaves of the plant affected; the larvae are orange-yellow, and pupate in the galls. This is another species which must have several broods in a year. The galls may be found from June to October. From June galls I have had the midges emerge in July, while from August galls they did not emerge until the following April and May.

*Rhabdophaga rosaria*, H. Loew, causes the terminal leaves of various species of *Salix* to form a rosette; they may be found upon *Salix alba*, L., *S. aurita*, L., *S. caprea*, L., *S. cinerea*, L., and upon many of the hybrid willows; they vary in size, according to the size of the leaves of the plant. The galls may be found from September to April, the midges emerging in April, May, and June.

*Rhabdophaga salicis*, Schrank, causes a twig gall on *Salix* spp., these vary in size and form, according to the species of *Salix* which they affect. The larvae pupate in the gall, the midges emerging in April and May. The genus *Rhabdophaga* contains what we might well call the giants of the Cecidomyiids.

Two rather interesting species are *Macrodiplosis dryobia*, F. Loew, and *Macrodiplosis volvens*, Kieff., both these species cause the marginal lobes of oak leaves to fold over; in the former species they fold downwards, and in the latter they fold upwards. The folded portion is usually of a lighter green than the rest of the leaf, and has a more or less mottled appearance. The larvae differ in colour, those of *M. dryobia* being whitish, while those *M. volvens* are yellow.

The galls may be found from May onwards, but I have never found larvae in them after the end of July, they are single brooded, the midges appearing in May.

I have not time to refer to the very numerous species of the many genera remaining, but will make a few remarks about the flower-bud galls caused by these flies.

There are many of these where the colour of the larvae is of great assistance in enabling one to determine the cause of the gall.

The flower-buds of *Viburnum lantana*, L., and *Viburnum opulus*, L., are to be found considerably swollen, these may be affected by either *Syndiplosis lonicerearum*, F. Loew, or *Contarinia viburnorum*, Kieff., there is nothing externally to give us a clue as to which species has caused this gall, but if we open some and examine the larvae we shall know at once; the larvae of the former species being lemon-yellow, while those of the latter are white.

There are two species affecting the flowers of Elder (*Sambucus nigra*, L.), which may be distinguished in the same manner; they are, *Arnoldia sambuci*, Rüb., with white larvae, and *Schizomyia nigripes*, F. Loew, with yellow.

If the flower-heads of any species of the Compositae are examined, one will almost invariably find some Cecidomyiid larvae in them, either yellow, orange, or red in colour, these larvae belong as a rule to the Phytophagous species, and they feed upon the seeds, florets, etc., without causing any distortion of the parts. I have found them from July to November, the Midges emerging from August of the same year until July of the year following.

Another group of these insects have larvae which feed entirely upon fungi, and in 1922, a new species was described, which had been found to cause a gall upon a fungus.

It is not possible in a short paper such as this, to go into details of many of these interesting creatures; there are over 300 species known to occur in Britain, a great number of which have not yet been described.

The remarks I have just made with reference to the insects of this family, have I trust, shown that there is an unlimited field for interesting research among the Gall Midges.

## On the Prothoracic Glands of the Larvae of the Drepanidae and Notodontidae (Lep.).

By K. G. BLAIR, D.Sc., F.R.E.S.—Read 28th September, 1933.

Attention has already been drawn to the presence of a pair of eversible prothoracic glands or sacs in the larvae of *Drepana lacertinaria*, L.<sup>1</sup>, but no comparison was made by the Author with the larvae of allied species. As a matter of fact glands more or less similar to those described by Dr. Cockayne for *D. lacertinaria* occur in all the British representatives of the family (I have not been able to examine the larvae of *D. harpagula*, Esp., but this species is so closely allied to its congeners that such can scarcely fail to be present.) In *D. falcataria*, L., the glands when everted are stout, somewhat similar to those of *lacertinaria* but much smaller, and the crown of the everted structure lacks the strong ridges found in the latter species. In *D. binaria*, Hufn., and *cultraria*, Fab., the everted bladders are more slender, slightly longer than thick; in *binaria* brownish with more coarsely granulated cap, in *cultraria* clear and colourless with finely granulated cap. In *Cilix glaucata*, Scop., they are shorter and stouter and of the same brown colour as the body.

In the living larva, and often in blown specimens, the presence of these eversible glands is apt to be overlooked, though when sought for the lips of the openings can usually be detected. In living larvae of none of the species mentioned could eversion of the sac be obtained by irritating the larva, though in all of them it was everted when the larva was subjected to slight pressure between the fingers, most readily perhaps in *lacertinaria* and least so in *binaria*. Eversion is evidently effected by pressure of the body contents, but no tendency towards a distension of the fore part of the body, such as might bring about eversion, was observed in a free larva even when irritated.

As to the morphology of these sacs it is difficult to avoid the conclusion that they represent the prothoracic gland of the allied *Notodontidae*. The gland in blown Notodontid larvae seems seldom to be everted, but I am exhibiting examples of *N. dictaea*, Esp., *N. dictaeoides*, Esp., and *D. chaonia*, Hb., in which it is seen to be a paired structure of comparatively large size, suggesting a bow necktie, consisting of a median piece and two lateral bifurcate lobes which in the first mentioned extend even beyond the sides of the head. In most other larvae of this family, especially in *Cerura*, the opening of the gland is usually to be seen, and most probably indicates the presence of these eversible sacs, but the gland does not seem to be present in *Pygaera* or *Phalera*. Before blowing gentle pressure of the freshly killed larva will secure the eversion of the sacs; even though they be again withdrawn, they will more readily be shot out

<sup>1</sup> Cockayne, E. A., 1927, "Proc. Ent. Soc. II. p. 64."

when the skin is distended with air, but if they do not at once appear a little coaxing with a soft brush may aid their eversion.

A median but unpaired gland is found in a similar situation in various Noctuid larvae, e.g., *Acrionicta menyanthidis*, View., *Diloba caeruleocephala*, L., *Leucania straminea*, Treits., *Ochria ochracea*, Hb., *Noctua xanthographa*, Fab., etc.; and probably in many species what appears to be a prosternal tubercle may in reality be the lips of this eversible sac.

As to the functions of these glands there can be no doubt that in *Cerura* at any rate it serves a defensive purpose, since from it a jet of formic acid can be directed upon an enemy. The gland of *C. vinula*, L., has frequently been the subject of investigation, and an excellent summary of our knowledge of it has been given by Latter<sup>2</sup> but I have been unable to observe any indication of such a use of the gland in the *Drepanidae* or in any other Notodont, neither am I aware of any published observations indicative of such a use. Latter has shown that the secretions of the gland in *C. vinula* are also of use in the construction of the cocoon, having an agglutinating action on the secretions of the silk glands rendering the silk extraordinarily tenacious, hard and waterproof. It is therefore probable that the essentially similar but less developed gland of other Notodonts would have a similar function; in fact it may be possible to demonstrate a correlation between the development of the simple prosternal gland of apparently relatively sporadic occurrence in Noctuid larvae with the leathery or papery rather than loose silken texture of the cocoon. On the other hand the gland seems to be wanting in the *Lasiocampidae*, a family closely related to the *Drepanidae*, and in the *Zygaenidae*, both with strong cocoons. In the *Lasiocampidae* and *Saturniidae* it is the very lack of this adhesiveness of the silk that renders it so valuable in commerce. In the *Hylophilidae* the gland is well developed in *Sarrothripa* and *Hylophila prasinana*, L., but apparently absent in *H. bicolorana*, Fuess. (though its apparent absence must, as stated above, be accepted with caution until a living or freshly killed larva can be examined).

Dr. Cockayne expresses the opinion that the glands of *Drepana* are situated too wide apart and too far back to be homologous with the prothoracic glands of other larvae, but it is difficult to find any other explanation for them. Latter has shown that the eversible lobes of *Cerura* are not part of the gland itself, but diverticula of a chamber that he calls the vestibule of the gland. This would apply also to the eversible structures of other Notodonts and it seems reasonable to suppose, if not that the whole structure, gland included, has become paired and divided, then that these eversible sacs may have some function undetected by us apart from the gland, and be retained after the gland itself has been lost.

<sup>2</sup> Latter, O. H., 1897, "Trans. Ent. Soc. Lond." pp. 113-125, Pl. V.

## A Season in Arctic Russia.

By E. A. COCKAYNE, D.M., F.R.C.P., F.R.E.S.

*Read 12th October, 1933.*

In 1917 the chances of war took H.M.S. "Intrepid," in which I was serving, to the Murman Coast of Russian Lapland and gave me an opportunity which has fallen to the lot of few entomologists, that of observing the passage of a whole season in the Arctic. Although my collections are small and must give an inadequate picture of the fauna and flora, I have been encouraged to publish an account of them because of the paucity of records from this region. I collected under difficulties, for I never slept ashore for a single night, and owing to the high tides, and the jagged rocks, which surrounded the entire coast, I could never leave my boat tied up, so that, whenever I landed, I had to arrange for a boat to meet me for the return journey. Often no boat was free at the hour at which I wished to land or come back, and some of the finest days were lost, because my duties kept me confined to the ship.

On the 1st of May after passing 200 miles north of the North Cape over a sea covered with ice floes, we entered the Kola Inlet and anchored off Murmansk. The inlet is flanked by steep hills, wooded at the bases, bare and boulder-strewn at the summits. The valleys and hollows in the hills are very marshy and in them grow several species of *Salix*, dwarf birch, and small alders, with a few aspens here and there. The drier slopes are covered with birches, pines, spruce trees, juniper bushes, and an occasional stunted mountain ash. On our arrival the ground was covered with deep snow and I never saw this place in summer, but I think that insect life must be far richer here than at other parts of the Murman coast.

Even as early as 4th May, when the water of the inlet was full of large masses of floating ice and the banks were deep in snow, numerous flies were sitting on the snow and spiders of at least three species were running over its surface. On the steepest hill-sides, where the scanty covering of snow, which could collect during the winter, had melted, I turned over the stones and found many small *Staphylinidae*, including one new species, ants, and centipedes, and a brown Noctuid larva, which I failed to rear. Heavy snow fell on the next day or two, but on 14th May, it was warm



MAP OF THE YUKANSKI ISLANDS.  
with mouth of Yokanga River on right.





*Photo : E. A. Cockayne.*

1. LYETNI, the Lapp village at the mouth of the Yokanga.
2. VITTE ISLAND, South Shore in June.



and sunny and on the fresh coating of snow hundreds of flies, chiefly Tachinids and Anthomyids, were resting, dozens of Lycosid spiders were scampering about and the tiny wingless scorpion flies, *Boreus hyemalis*, were disporting themselves. An empty cocoon of *Zygaena exulans* was found attached to a rock and an *Ichneumon vulneratorius* in a crack in the sand. Blizzards accompanied by a bitterly cold North wind lasted until 26th May, but in spite of the cold a large number of nests of *Formica fusca* and one of *Leptothorax acervorum* were discovered under stones, and in all of them there were larvae in all stages of development.

We had a welcome sign of spring on 23rd May, in the arrival of several pairs of the graceful Buffon's skua and some waders and Arctic terns. On 22nd May, one, and on 30th May, two more day-flying moths were seen. They resembled *Brephos parthenias*, but were probably *Epirrhanthis diversata*. Slippery rocks and snow-drifts, thigh deep and too soft to bear one's weight, made it impossible to catch them. We had snow-storms again until 2nd June, a day on which two specimens of the beetle *Patrobis septentrionis* were taken. On 6th June, we got ashore on the Western side of the inlet with some difficulty owing to heavy ice floes, and caught two Tineids, *Plutella maculipennis*, in the drizzling rain. Cotton grass was then in flower and the birch buds were opening.

On the evening of 6th June we sailed for Yukanski, our final destination, having heard that the harbour was free from ice, and twenty-four hours later, arriving in a heavy snow storm, our hearts sank as we saw the bare and inhospitable shore. Yukanski harbour lies a little to the North-west of the entrance to the White Sea in Lat. 68°6' N. and Long. 39°27' E., about 200 miles by sea from the Kola Inlet, and is protected on the East by the Cape Sviatoi Nos, which rises to a height of 300 feet, and on the North by a chain of small islets, the Yukanski Islands. Several miles to the East the Yokanga River enters the sea after a course of 67 miles, its mouth sheltered on the Eastern side by a high granite bluff, Cape Tolstoi. The river runs between steep cliffs, but here and there are sheltered slopes and level patches, where many plants not seen elsewhere in the district, such as *Phaca frigida* and *Dianthus superbus*, grow in plenty. No doubt the fauna also is much richer than that of the neighbouring coast, but my opportunities of proving this were small. Near the south of the river is a small Lapp settlement, Lyetni, the only village within 30 miles, and its only communications are by sea.

We anchored under the lee of Vitte Island, Bezimyanni Island of the older maps, where much of my collecting was done. This, the largest of the Yukanski Islands, is about  $2\frac{1}{2}$  miles long and  $\frac{1}{4}$  to  $\frac{1}{2}$  a mile wide, lying with its long axis parallel with the mainland. The east end is low, but at the western extremity there are high rocky cliffs, and the centre rises to an elevation of 264 feet. All the

higher parts are covered by a thin layer of peat, bare in places, but for the most part clothed with reindeer moss and a low growth of crowberry, whortleberry, bearberry, *Loiseleuria procumbens*, and *Diapensia lapponica*, amongst which twine the long creeping branches of dwarf birch and *Salix rotundifolia*. Here and there taller tufts of *Oxytropis* maintain a precarious existence. The south side of the island falls steeply to the sea and supports a less stunted growth of the same plants mingled with large clumps of *Cornus suecica* and bilberry, bushes of juniper, and the thin trailing stems of the graceful *Linnæa*. Immense numbers of worn granite boulders are scattered all over the tops and slopes of the hills and piled up at the bottoms of the valleys. Just above highwater mark there are huge rough granite rocks, in the cracks of which grow Rose-bay willow-herb, lovage, *Lychnis alpina*, *Conioselinum fischeri*, *Geranium*, harebells, stone-crop, the rare *Chrysanthemum arcticum*, and ferns in profusion including the oak fern and the scarce *Asplenium crenatum*. The most precipitous slopes have a thin covering of grasses, and on the cliffs at the western end are dense beds of chives, of which the globe-shaped flower-heads form a sheet of purple in the summer, and between the rocks themselves are big clumps of the pink *Silene acaulis*. The brackish ground at the foot of the cliff is covered with *Cochlearia arctica*. In the hollows of the hills are hundreds of pools and marshes, some with great beds of cotton grasses and sphagnum, others overgrown with cloudberry and the dwarf *Salix polaris*, while along the stream grow willow and birch bushes.

Where the granite has disintegrated and the silt carried down by the streams has collected, there are grassy patches with many herbaceous plants. In these favoured corners ragworts, golden-rod, *Pyrethrum bipinnatum*, and *Saussurea* give a surprising touch of brightness to the dark landscape.

On the mainland, range upon range of low hills, grey and boulder-strewn, run parallel with the coast, each successive range a little higher than the last, and in the valleys between them lie seemingly endless chains of lakes and marshes forming the Tundra of Northern Lapland. Innumerable deep gullies cut through the most northerly hills to the coast, some filled with a confused mass of rounded boulders, others with thickets of willow and birch. The Yukanski Islands are really the most seaward of these ranges and are crossed by gullies running north-east like those on the mainland. Under the shelter of the rocks on the mainland the birches grow into little trees reaching a height of fifteen feet, but where it is less sheltered they are mere bushes. The gullies are filled with swift torrents from the melting snow until late in June, but as soon as these shrink to little streams their banks are covered with grasses and flowering plants. Only just above sea level deep snow drifts remain throughout the summer in the shade of the rocks. Pine, spruce, and alder are not found in the district, and aspens and

mountain ashes only grow as low bushes and fail to flower. The seeds of the former are probably wind-borne and those of the latter carried by birds. Ling (*Calluna vulgaris*) grows neither on the islands nor the mainland.

The climate at Yukanski was not a bad one during the summer. The usual sequence was three bright cloudless days followed by a series of dull or wet ones or two or three cold foggy ones, and then cloudless sunshine again. In June there were ten sunny days, one day with a good deal of sunshine, five hopelessly wet, including the 18th when it snowed all day, and six cloudy and cold. In July there were seven beautiful sunny days, four with sunshine for about half the day, seven wet, five cold and windy, and four foggy. In August there were eleven sunny, one fairly sunny, five wet, one snowy, six foggy, and four cold cloudy days. In September up to our departure on the 5th two days were sunny, two wet, and one foggy. Many of the fogs were local sea fogs and it was sunny inland. The only thunderstorm took place on 13th July and was accompanied by a heavy fall of hail. The sunny days and many of the wet ones were pleasantly warm, the temperature rising even to 83° and 84° F. on 18th and 19th July respectively. Unfortunately I can give few actual temperatures, because my charts of the maximum and minimum daily temperatures were lost. At Murmansk in May the daily mean was about 38°, the highest readings being 44° on the 6th and 26th, and 48° on the 27th, while from the 19th to the 25th it never rose above 28° and was only 20° F. on the 19th. The Arctic Pilot gives the following mean temperatures for this coast:—13th May-12th June, 44°, 13th June-12th July, 53°, 13th July-12th August, 61°, and 13th August-12th September, 58°.

Passing from the general description of the country and its climate, I will continue with extracts from my diary to give an impression of the progress of the season. The lovely golden catkins of *Salix lanata* were out in the Yokanga valley on 12th June, but appeared to be quite unattractive to insects. Growth in this land of continuous sunshine, where the sun never sets from mid-May to mid-July, was extremely rapid. *Veratrum album*, which was only just peeping from the ground on our arrival, was quite tall on 15th June, and *Viola bicolor*, covered by snow on 7th June, was in flower on 20th June. On the 15th the ponds were full of water beetles and larvae of caddis-flies, dozens of tiny gnats and daddy-long-legs were flying over the marshes, and queens of *Bombus alpinus* were visiting the flowers of *Arctostaphylos alpina*, but no moths or butterflies were seen. On June 20th I saw the first moth, *Plutella maculipennis*, on Vitte Island, and on the 23rd many queens of *Bombus alpinus*, one of *B. hypnorum*, and one of *Vespa sylvestris* were on the wing. On the next day *Vespa norvegica* appeared, and I caught the first butterfly, *Aglais urticae*, flying over the snow. As

I discovered later, the only nettles grew eight miles away across the sea, and were still buried deep under the snow. The fore-runner of the hordes of hungry female mosquitoes, which were soon to prove the torment of our lives, was noticed on the 24th. On 29th June I caught *Eupithecia satyrata*, a broad-winged pale grey form with well-marked discal spot, and saw the first real spring butterfly, *Aporia crataegi*. More were reported from the island on the 26th and with them the first *Erebia lappona*. On 29th June I landed on the west end of Vitte and caught two worn *Anarta melanopa* r. *vidua* and then made my way to the south-western extremity, where amongst the piled up rocks I took 2 *Erebia lappona*, 2 *A. crataegi* (females with very scaleless forewings), 1 *Pieris brassicae* (male), 1 *P. napi* female r. *bryoniae*, 2 *Brenthis freija*, and 1 *Callophrys rubi* r. *polaris*. About half a dozen more *crataegi* were seen flying along the shore, but I never discovered their food-plant. There is no *Crataegus*, *Prunus padus* or *Cotoneaster* anywhere, and mountain ash, scarce on the mainland, does not grow on the island. *Rubus chamaemorus*, which is abundant, seems to be the most likely pabulum. The early emergence of the species suggests that the larvae, like those of other Arctic butterflies, may hibernate for two winters. The life of these Pierines must be very brief, for they had all come and gone within a week. On the same day three *Xanthorhoë fluctuata*, with the darker markings very indistinct, several *Eulype hastata*, r. *subhastata*, and a male *Ematurga atomaria*, similar to the Scottish moorland form, were also captured. *Atomaria* must be uncommon, for this was the only one seen in 1917, and Captain Gwatkin-Williams took only one in 1916.

On 2nd July *Psodos coracina* and *Sympistis lapponica* appeared on the scene, and on the 4th *Anarta staudingeri* and *Agrotiphila quieta*. On 7th July the first *Sympistis melaleuca* and *Gnophos sordaria* and the only *Pyrausta funebris* were taken. The last species was found near the shore of a small lake, where caddis-flies were hatching in great numbers. On 9th July I caught a small specimen of *Erebia disa*, with an unusually dark underside, in a grassy marsh on the mainland, and saw a second one. Although, according to Captain Gwatkin-Williams, it was locally abundant in 1916 I saw no more in spite of a careful search all around the spot on several occasions. It is one of the prizes of the Arctic, and W. G. Sheldon wrote in 1912 that Dr. Chapman and he were the only Englishmen who had seen it alive. *G. sordaria* and *Cosymbia pendularia*, a dead specimen of which had been found floating on a pool on 3rd July, and the first *Brenthis aphirape* were also taken on this date. *Eulype subhastata* was already becoming worn. It was most abundant amongst the birch bushes on the mainland, but was also common on the moorland parts of the island, and was often found at rest on the rocks. On 11th July *Brenthis arsilache* began to emerge, and single specimens of *B. polaris* and *B. euphrosyne*, both worn, were

captured. *B. freija* was common, but in very poor condition. Its head-quarters appeared to be a valley running east and west on the mainland, where it flew along the edge of the marshes bordering small streams or lakes. Next to *arsilache* it was the commonest butterfly, and was swifter than any other *Brenthis*. *B. polaris* is another of the great rarities of the Arctic, and Mr. Sheldon, who kindly confirmed the identification of my specimen, said in 1912 that he was the only Englishman who had seen it on the wing. Both Schoyen and Sheldon suspect that the food-plant of *polaris* is *Dryas octopetala*, a plant which I did not see at Yukanski. Though *Dryas* prefers limestone, which is not found at Yukanski, it will grow on granite, and the specimen may not have wandered far.

On 12th July a brilliantly sunny day, *Noctuae* were flying in large numbers, but they were, as usual, most difficult to catch. *S. melaleuca*, *S. lapponica*, *Agrotiphila quieta*, *Anarta staudingeri*, and a very small *Anarta richardsoni* were taken. The moth identified as *richardsoni* is very unlike any in the National collection and I am not convinced that it is not a new species.

The silvery ab. *wahlbergi* of *P. coracina* was now common and *Tortrix riburnana* was flying in the sunshine all over the higher parts of the island. A *C. pendularia*, which laid some eggs, was found on the summit of the island, where it must have fed on *Betula nana*, and the moths bred from it in December and January were very pale and almost devoid of markings. On 14th July on the mainland, *B. freija* was commoner than ever, but very tattered, while *arsilache* and *aphirape* were still scarce, but fresh. The first *Lycæna optilete* was seen amongst *Vaccinium*, growing under some scattered birch bushes, and later it became quite common in similar situations. It is interesting that the larva has no honey-gland, and, unlike most *Lycænidae*, is not associated with ants. The only ant found at Yukanski was *Formica transkaukasica*, which lives in sphagnum, and would be unlikely to come into contact with the *Lycænid* larva on *Vaccinium*. On the same day the only *Xanthorhœ incurmata* was captured. 17th July was the earliest date on which *Colias palaeno* was seen. This insect frequented places on the mainland, where birches were sparse, and the ground was covered with grass and flowers. Around such areas its food-plants *Vaccinium myrtillus* and *V. uliginosum*, grew in abundance.

For some time past the mosquitoes had become almost intolerable. Anywhere out of the wind they surrounded one in a dense cloud, settling so thickly on one's clothes that a white cap-cover appeared to be black, and a monkey jacket looked like velvet. Here they probed the cloth in vain, but they could bite most successfully through thick service trousers, wherever these touched the skin.

I sugared for the first and only time on 18th July, in a sheltered gully on the birch trunks and tufts of herbage on the face of the rock. Not a single insect of any kind came to the bait, but the

mosquitoes swarmed. In spite of netting, which left only our faces exposed, and oil of citronella on our faces, hands, and ankles we were driven to distraction. We swallowed dozens, and got them into our eyes, and our faces were plastered with their dead bodies. During our fairly long walk to the boat I caught a glimpse of the only night-flying Noctuid seen at Yukanski, and saw three Geometers and three or four 'micros' on the wing. On the next day several Dragon-flies, *Somatochlora arctica*, were hawking for prey amongst the shallows, but were hard to catch.

On 23rd July, the creeks on the north side of the island were very pretty; a splendid variety of the harebell flowered in profusion in the chinks of the rocks, and the ground below was white with the blossoms of *Stellaria* and *Matricaria*. Numbers of the Longicorn, *Acmaeops pratensis*, were seen on the latter plant on 27th July. A long day's expedition was made to the Yokanga Valley on 1st August. Here many tall herbaceous plants were flowering amongst the broken rocks at the foot of the steep banks; a dozen *C. palaeno* were flitting over them, several *Xanthorrhoe munitata* were disturbed, and a silvery white form of *Cnephasia osseana* was locally common. The *munitata* are referable to the race *algidata*, Stgr., with poorly marked median band, and one has a pale ochreous colour. *Lycæna optilete* was almost over, but two males of *Pygmaena fusca* were caught flying amongst the *Eupetrum*. *Brenthis arsilache* was very common, and looked very brightly coloured as it took its short flights over a grassy marsh. Owing to a sea fog we had to walk inland and across country to a point opposite to the ship, a walk of only eight miles as the crow flies. It took us from 8 o'clock in the evening until 2.30 the next morning, and as we had had nothing to eat since midday we were completely exhausted. The chief interest of the walk lay in the great scarcity of night-flying moths. Although the sun shone nearly all the time we saw only four 'macros,' *Gnophos sordaria*, *Entephria polata*, and *Eupithecia hyperboreata*, and a few 'micros,' but the mosquitoes harassed us incessantly.

In the village there were a few clumps of nettle, the only ones seen in the district, and four or five worn *Aglais urticae* were flying around and many families of their larvae were feeding on them. On 5th August, I caught a worn *Pionea inquinatalis* and near the Lapp settlement the big hairy fly, *Oedemagena tarandi*, a parasite of the reindeer, was flying in company with many *Bombus lapponicus*. This bee is the commonest in the district and the fly, in colour and pattern, bears a very close resemblance to it, though its flight is different. At a later date I saw a few of the flies and many of the bees visiting flowers on the same bank on Vitte Island, and noticed again how remarkably alike they were.

On 7th August and several times during the next week swallow-tails were reported from the island, but I never saw one myself.

However on 3rd September, I found a larva of *Papilio machaon* on *Conioselinum fischeri*, an umbellifer which grows amongst the rocks close to the sea. A careful search for more was unsuccessful, nor could I find traces of their former presence. Later a heavy fall of snow hid the plants and my larva died of starvation.

By 14th August, butterflies and moths were disappearing fast. A few worn *arsilache* and *melaleuca* lingered on, and *polata* was still to be found at rest on the rocks, and the last of three *Tinea pellionella* was taken on the uninhabited island of Vitte. Although it seems to be an unlikely locality for a clothes moth, I do not think they came from the ship. If there had been any on board I should have seen them myself or had them brought to me. I think they live there wild and feed on the fur of the innumerable dead lemmings. Another visit was paid to Yokanga on 20th August, but we saw nothing except a worn *palaeno* and a battered *lappona*. In the Lapp village some batches of larvae of *urticae* were still in their first instar, but others were nearly full-grown, and I took some of the biggest with a plant of nettle, which I planted in my cabin. On 24th August, no Lepidoptera at all were seen at Yokanga, but plenty of larvae of *Eulype subhastata* were feeding in their little tents on *Vaccinium myrtillus* and *uliginosum*, a few on birch, and one on willow.

The bilberries and crowberries were now ripe, and my larvae of *urticae* and *pendularia* were beginning to pupate. On the 31st, I beat juniper, willow, and birch without getting a single larva, and collected seed-capsules of *Lychnis alpina* with the same lack of success. There were many leaf-miners in the willow, birch, *Vaccinium*, and *Hedysarum*, but no imagines were bred.

On 3rd September I was surprised to see an *Issoria lathonia*, in perfect condition, on Vitte Island. It settled three times close to me on the bare peat, opening and closing its wings and showing the silver markings of the under-side, but by the time I had put the net together it had gone.

We left Yukanski on 10th September and went to the gulf of Pechenga (Peisen Fjord) Lat. 69°41' N., Long. 31°25' E. Pechenga lies near the head of a fjord nine miles long, which is the first inlet on the Murman coast, near the eastern boundary of Norway and about 60 miles west of Murmansk, as the crow flies. Although not comparable in the grandeur of its scenery with that country, it was a welcome change from the monotony of Yukanski. The hills are much higher and bolder in their contours, and in the wide inland valleys there are extensive marshes, lakes of considerable size, and big woods of ancient weather-beaten birches. The moorland vegetation is similar to that of Yukanski, but much less stunted, and the grassy patches, covered with *Archangelica*, *Lychnis alpina*, *Dianthus superbus*, *Senecio*, and *Solidago*, are larger and more numerous. Many small rivers with Finnish villages at their mouths

open into the gulf. Near these every tree has been cut down, but a few miles inland there are woods of birch, pine, spruce, mountain ash, and alder. The only moth found was *Oporinia autumnata*, which was fairly plentiful on 21st September amongst the old birch trees some miles to the west of the gulf. The form was a very pale silvery grey one. In all the villages nettles were common and many larvae of *A. urticae* were still quite tiny, others were full-grown, and a few empty pupa-cases were found. My larvae from Yokanga and Pechenga produced the first imagines on 28th October and those from both localities were small and dark with some var. *polaris* among them. This butterfly must have a terrible struggle for existence. Towards the middle of September the weather began to grow colder, and the ptarmigan and mountain hares were changing into their winter garb. There was a heavy fall of snow on 22nd September, and although it was followed by a temporary thaw, winter finally set in on 1st October, with a series of violent gales. Numbers of larvae and pupae must have perished. A few *urticae* had emerged even before we reached Pechenga, and the emergence must have continued while we were there, but not one was seen on the wing on the warm sunny days, when I visited the villages. There can be little doubt that they go into hibernation as soon as they have left the pupa.

Lycosid spiders were very numerous everywhere, Thomisids were not infrequent, but Epeiras were seldom seen except round the margin of one lake, where hundreds of their webs were spun between the rocks along the shore. Harvesters were fairly common. Small land birds are very scarce in the neighbourhood of Yukanski, and the spiders are probably the worst enemies of the insects.

In the long period during which the sun never sets, the butterflies settle down to rest at much the same hour as in more southern latitudes and the diurnal moths cease to fly. Although the sun may be brighter and the temperature higher at night than during a day on which they have been active, they do not fly voluntarily nor can they be disturbed. The nocturnal Geometers could be roused by day, but their natural flight did not begin until the late evening, when they could be seen flying about in the bright sunshine. This interesting fact has been commented on before—Sheldon, for instance, notes that Diurni are on the wing from 8 a.m. to 4 p.m. and Geometers from 6 p.m. to midnight, and Chapman says that the hours of flight of different species, both butterflies and moths vary very little from those natural to them in the south—but it does not appear to be well-known. The only insect, which was equally active by day and by night was the mosquito, the plague of the Arctic.

Apart from the scarcity of species the scarcity of individuals of most species struck me very much after my experience of Scotland, where *melanopa*, *coracina*, and other moths are so abundant. No

doubt some species were overlooked, but, if so, they must have been either scarce or local. The absence of limestone with its special plants, such as *Dryas octopetala*, the food-plant of *Syrichthus andromedae* and *Sympistis zetterstedti*, explains why these do not occur, but the food-plants of many Arctic Lepidoptera, which were not seen, were common everywhere. Limestone is present at Ivanovski, many miles to the west, and this locality, which we visited for a few hours looked very promising. The weather conditions cannot be held responsible because, for the Arctic, they were quite good, and in the previous year they had been even better. Annandale says that in sub-arctic regions the scarcity of species is made up by the abundance of individuals, and states that in the Faroes every rock and wall has its grey daddy-longlegs, and every flower its crowd of hover-flies, and Walker speaking of Iceland, says many non-entomological travellers have been strongly impressed by the enormous numbers of individuals met with in favourable seasons and situations. I think the scarcity of species and individuals at Yukanski is most likely due to the nature of the land, which is notably inhospitable even for that inhospitable coast.

The season for Lepidoptera was astonishingly short; they began to emerge about the 20th of June and by the 14th of August only a few worn stragglers were left. With scarcely an exception they had come and gone within a space of two months. This is all the more surprising, because the latter half of August and the first half of September were quite as fine and warm as the earlier summer. My experience agrees with that of Annandale, who remarks that in the Faroes moths, which were common at midsummer, are already scarce in August. It is less true of other orders, for these appeared before them and lasted long after them.

Another feature of the Lepidoptera which I collected, is the high percentage of Holarctic or circumpolar species; eight of the sixteen Rhopalocera and seventeen of the Heterocera including *Pyralina*, but excluding *Tineina*, have a circumpolar distribution and another, *E. hyperboreata*, extends to Greenland. This may be another indication of the severity of the climate and exposed position of Yukanski.

We returned to Yukanski on 27th October, staying until 1st December, when we sailed for Murmansk. The sun now no longer rose above the horizon even at midday and the country had settled down to its winter sleep. On 7th December, the Russian warships and the town flew the red flag and went over to the Bolsheviks, and after an anxious fortnight we sailed for home on 21st December.

In conclusion I wish to thank those, who have so kindly identified the insects and plants included in the following lists and whose names are mentioned in the appropriate places. The locality, where none is given, is Vitte Island, the mainland of Yukanski opposite or the Yokanga valley, eight miles away.

In the list of Lepidoptera the circumpolar species are marked with an asterisk.

## RHOPALOCERA.

*Papilio machaon*, L.\* (7.viii., larva 3.ix.), *Aporia crataegi*, L. (25.vi.), *Pieris brassicae*, L. (29.vi.), *P. napi*, L. r. *bryoniae*, Ochs.\* (29.vi.), *Colias palaeno*, L. r. *lapponica*, Stgr.\* (17.vii.-23.viii.), *Aglais urticae*, L. and ab. *polaris*, Stgr. (23.vi. and 21.viii.-21.ix.-28.x.), *Brenthis freija*, Thnbg.\* (29.vi.-18.vii.), *B. arsilache*, Schiff.\* r. *lapponica*, Stgr.\* (14.vii.-14.viii.), *B. aphirape*, Hb. r. *ossianus*, Hbst.\* (9.vii.-1.viii.), *B. euphrosyne*, L. (11-18.vii.), *B. polaris*, Boisd.\* (11.vii.), *Issoria lathonia*, L. (3.ix.), *Erebia lappona*, Esp. (28.vi.-20.viii.), *E. disa*, Thnbg.\* (9.vii.), *Callophrys rubi*, L. r. *polaris*, Mosehl. (29.vi.), *Lycaena optilete*, Knoch. r. *cyparissus*, Hb. (12.vii.-2.viii.).

## HETEROCERA.

NOCTUIDAE. AGROTINAE.—*Agrotiphila (Schoyenia) quieta*, Hb.\* 4-12.vii.). CUCULLIINAE.—*Sympistis melaleuca*, Thnbg.\* (7.vii.-14.viii.), *S. lapponica*, Thnbg.\* (2-17.vii.). HADENINAE.—*Anarta melanopa*, Thnbg.\* race *vidua*, Hb. (29.vi.), *A. staudingeri*, Auriv.\* (4-17.vii.), *A. richardsoni*, Curt.\* (12.vii.).

GEOMETRIDAE. ACIDALIINAE.—*Cosymbia pendularia*, Cl. (3-18.vii.). LARENTIINAE.—*Oporinia autumnata*, Bkh.\* typical, some nearly white (Pechenga, 21.ix.), *Xanthorhoe munitata*, Hb.\* (18.vii.-1.viii.), *X. fluctuata*, L.\* (29.vi.-7.vii.), *X. ferrugata*, Clrk. (29.vi.), *X. incursata*, Hb.\* (14.vii.), *Entephria (Dasyuris) polata*, Dup.\* pale grey and banded forms (2-14.viii.), *Eulype hastata*, L. r. *subhastata*, Nolek.\* (29.vi.-17.vii.) and larvae (22.viii.-3.ix.), *Eupithecia hyper-boreata*, Stgr. (3-18.vii.) *E. satyrata*, Hb. (25.vi.-3.vii.). GEOMETRINAE.—*Epirrhantis diversata*, W.V. (seen at Murmansk, 23.v.-30.v.), *Gnophos sordaria*, Thnbg. (9.vii.-1.viii.), *Psodos coracina*, Esp. ab. *wahlbergi*, Lampa. (2.vii.-3.viii.), *Pygmaena fusca*, Thnbg. (1-5.viii.), *Ematurga atomaria*, L. (29.vi.).

## PYRALINA and TINEINA.

(determined by the late Jno. Hartley Durrant).

PYRALINA. PHYCITIDAE.—*Laodamia fusca*, Hw.\* 2 (25-29.vi.), *Polypneustis annulatella*, Ztst.\* 18 (5-12.vii.). PYRAUSTIDAE.—*Pyrausta funebris*, Ström.\* (*octomaculata*, L.) 1 (7.vii.), *Pionea inquinatalis*, Zell.\* 1 (5.viii.).

TINEINA. GELECHIIDAE.—*Gelechia infernalis*, H.-S. 2 (9.vii.), *G. continuella*, Z.\* 8 (9.vii.-1.viii.). OECOPHORIDAE.—*Endrosis lactella*, S.-D. 1 (18.viii.), *Pleurota bicostella*, Clk. 10 (1-12.viii.), *Borkhausenia stipella*, L. 4. (18.vii.-5.viii.). OLETHREUTIDAE.—*Olethreutes schulziana*, F.\* 9 (29.vi.-1.viii.), *O. nebulosana*, Ztst. (*irriguana*, H.S.) 16 (9.vii.-12.viii.), *O. cespitana*, Hb. 55 (29.vi.-1.viii.), *Enarmonia mercuriana*, Fröl. 25 (24.vi.-13.viii.). TORTRICIDAE.—*Tortrix*

*viburnana*, S.-D., F. 41 (9.vii.-5.viii.), *Cnephasia osseana*, Sep.\* 28 (1-12.viii.). PLUTELLIDAE.—*Plutella maculipennis*, Crt. (Murmansk, 5.vi., Yukanski, 20.vi.-5.viii.). TINEIDAE.—*Tinea pellionella*, L. 3 (4-14.viii.).

TRICHOPTERA (identified by Kenneth J. Morton).

*Limnophilus scalenus*, Wall. (Pechenga, 21.ix.), *L. pantodapus*, McL. (9.vii.), *Asynarchus productus*, Morton (8.viii.), See "E.M.M." 1899, XXXV, 29, *A. pusarius*, Mc.L. (8.viii.), *Micrasema gelidum*, Mc.L. (11.viii.), *Limnophilus borealis*, Zett. ? larva.

ODONATA (identified by Herbert Campion).

AESCHNIDAE.—*Aeschna coerulea*, Strom. (8.viii.).

LIBELLULIDAE.—*Somatochlora arctica*, Zett. (2 ♀♀ Yukanski, 19.vii. and 1 ♀ Archangel Bar, Captain Hurt. R.N. 29.vi.), *S. alpestris*, Selys. (1 ♀ Yukanski, 19.vii.).

PANORPATA.

*Boreus hyemalis*, L. (Murmansk, v.).

PLECOPTERA.

*Campia sparre-schneideri*, Petersen, ♀ (Murmansk, 5.vi.), *C. mortoni*, Petersen, ♀ (Yukanski, 25.vi.), (identified by K. J. Morton), See Report of the scientific results of the Norwegian Expedition to Novaya Zemlya, 1921, No. 16, Videnskapselskapet i Kristiania, 1923. *C. nigra*, Pict or *C. atra*, Morton, ♀ (identified by M. E. Mosely).

EPHEMERIDAE.

*Ecdyurus ? venosus*, F. ♀ subimago (identified by M. E. Mosely). The other Ephemeroidea were unfortunately lost.

HYMENOPTERA (identified by the late Rev. Dr. F. D. Morice).

*Sirex gigas*, L. ♀ (22.viii.), *S. (Paurus) noctilio*, F. 3 ♀♀ (19.vi., 19.vii., 28.viii.), both probably from imported timber. *Rhogogaster punctulata*, ♀ (9.vii.), *Dolerus palustris*, 2 ♀♀ (25.vi.), *D. aeneus*, ♀ (24.vi.), *Lygaeonematus pallipes*, Fall. 5 ♀♀, *L. mollis*, Htg. (teste R. B. Benson), *Bombus hyperboreus*, 2 ♀♀ or large ♂♂ (4 and 19.vii.), *B. alpinus*, 3 ♀♀ (20, 23, 24.vi.) 3 ♂♂ (11, 14.viii.), *B. lapponicus*, 1 ♂ (5.viii.) 2 ♀♀ (11, 14.viii.) 3 ♂♂ (9, 17.vii.), *B. hypnorum*, L. 1 ♀ (20.vi.), *B. terrestris (lucorum)*, L. 1 ♀ (23.vi.), *B. jonellus*, K. 1 ♀ (5.viii.) 2 ♂♂ (1, 11.viii.), *Osmia nigriiventris*, Zett. 1 ♀ (5.viii.), *Vespa sylvestris*, Scop. 3 ♂♂ (Pechenga, 21.ix.) 1 ♀ (Yukanski, 23.vi.), *V. norvegica*, F. 1 ♂ (Pechenga, 21.ix.) 1 ♀ (Yukanski, 24.vi.) 2 ♂♂ (Yukanski, 11, 12.viii.), *V. rufa*, 1 ♀ (Yokanga, 5.viii.).

[ANTS.] (identified by H. St. J. Donisthorpe).

*Formica fusca*, L. (Murmansk), *F. transkaukasica*, Nasonow. (*picea*, Nyl.) (Yukanski), *Leptothorax acervorum*, F. (Murmansk).

ICHNEUMONIDAE (identified by Claude Morley).

*Ichneumon vulneratorius*, Zett. (Murmansk, 14.v.), *Phygadeuon fumator*, Grav. var. *borealis*, Roman. (14.viii.), *Atractodes truncator*, Roman. (14.viii.), *Stenomacrus pusillus*, Zett. (14.viii.), *Tryphon brunniventris*, Grav. var. *connectens*, Roman. (8.viii.), *Perilissus spilonotus*, Steph. var. *deficiens*, Morley (8.viii.), *Asphragis kolae*, Morley (9.vi.), *Limmerium turionum*, Ratz. BRACONIDAE.—*Microgaster globatus*, Nees, var. *amentorum*, Ratz. ALYSIIDAE.—*Alysia manducator*, Panz. CYNIPIDAE.—*Amblynotus opacus*, Htg.

COLEOPTERA (identified by Dr. K. G. Blair and Dr. M. Cameron).

*Carabus catenulatus*, Scop. (9.vii., 28.viii.), *Dyschirius globosus*, Hrbst. (Murmansk, 5.vi.), *Patrobus septentrionis*, Dej. (Murmansk, 2-5.vi.), *Cymindis vaporariorum*, L. (9.vii.), *Hydroporus melanocephalus*, Gyll. (24, 25.vi.), *Agabus congener*, Payk. var. (15.vi.), *A. guttatus*, Payk. (15.vi.), *A. unguicularis*, Thoms. (15.vi.), *Rhantus bistriatus*, Bergstr. (15.vi.), *Dytiscus lapponicus*, Gyll. ♂ and larva, *Philonthus chalcus*, Steph. (*succicola*, Thoms.) (Murmansk, 5.vi.), *Quedius* n.sp. (Murmansk, v.), *Oxyptoda lugubris*, Kr. (Murmansk, v.), *Atheta arctica*, Thoms. (Murmansk, v.), *Arpedium brachypterum*, Grav. (Murmansk, v.), *Thanatophilus lapponicus*, Hrbst. and larva (9.vii.), *Byrrhus fasciatus*, Forst. (25.vi.), *Aphodius lapponum*, Gyll. (25.vi.), *A. nemoralis*, Gr. (25.vi.), *Melanophila acuminata*, De G. (8.viii.), *Selatossomus costalis*, Payk. (15.vi.), *Cryptohypnus rivularis*, Gyll. and larva (8.viii.), *Podabrus lapponicus*, Gyll. and larvae (17.vii.), *Stenotrachelus aeneus*, Payk. (Pechenga, 2.ix.), *Pachyta lamed*, L. (28.viii.), *Erodinus interrogationis*, L. (Pechenga, 21.ix.), *Acmaeops pratensis*, Laich. (27.vii.), *A. septentrionis*, Thoms. (19.vii.), *Phytodecta affinis*, Gyll. and var. (on Sallow, 9.vii. and 26.viii.), *P. pallidus*, L. (15.vi.), *Aphthona herbigrada*, Curt. (26.viii.).

All these are recorded by Sahlberg ("Catal. Coleopt. Fenn." in "Acta Soc. Fauna Fenn." 1900, 19, No. 4) from Lapland except the *Quedius*, *Aphthona herbigrada*, and *Hydroporus melanocephalus*, but the last probably appears under a synonym. The following are not recorded from Russian Lapland, *Rhantus bistriatus*, *Agabus unguicularis*, *Aphodius nemoralis*, and *Acmaeops septentrionis*.

DIPTERA. NEMATOCERA. (identified by F. W. Edwards.)

CHIRONOMIDAE.—*Dasyhelea* sp. inc., *C. coracinus*, Zett. ♂ ♀, *C. moerens*, Walk., *Prosisoplastis phagnicola*, K., *Tanytarsus* sp., *Orthocladius* sp. (*stercorarius* auct nec Deg.). SIMULIIDAE.—*Simulium*

*ornatum*, Mg. ♀, *S. latipes*, Mg. ♀. CULICIDAE.—*Aedes alpinus*, L. (*nigrripes*, Zett.). TIPULIDAE.—*Phalacrocerca replicata*, L., *Dicranomyia* ? *cinereipennis*, Zundt., *Prionocera serricornis*, Zett., *Tipula macrocera*, Zett., *T. excisa*, Schum.

(Identified by J. E. Collin.)

BIBIONIDAE.—*Bibio pomonae*, F. ♀ (Pechenga). TABANIDAE.—*Haematopota pluvialis*, L. ♀, *Therioptectes borealis*, Mg. ♀. THEREVIDAE.—*Therera* ? *marginula*, Mg. ♂ (Murmansk). EMPIDIDAE.—*Lithamphomyia hybotina*, Zett. ♂, *Iteaphila macquarti*, Zett. ♂ (Murmansk). DOLICHOPODIDAE.—*Campsicnemus armatus*, Zett. ♂, ♀ (Murmansk), *Hydrophorus magnicornis*, Frey. ♂, ♀ (♂ with small Chironomids as prey). SYRPHIDAE.—*Chilosia* ? *melanopa*, Zett. ♀, *Sphaerophoria* sp. ♂, ♀, (Murmansk), *Eristalis tundrarum*, Frey. ♂, ♀ (Murmansk and Yukanski, a new species), *Helophilus borealis*, Staeg. ♀, *H. affinis*, Whlbg. ♂, *H. pendulus*, L. ♂, ♀, *Volucella bombylans*, L. ♂. TACHINIDAE.—*Trixa alpina*, Mg. ♂, ♀, *Cynomyia mortuorum*, L. ♂, *Phormia groenlandica*, Zett. ♂ (Murmansk), *Calliphora uralensis*, Villen. ♀ (Murmansk and Yukanski). OESTRIDAE.—*Oedemagena tarandi*, L. MUSCIDAE.—*Musca domestica*, L. ♀ (Murmansk and Yukanski). ATHOMYIIDAE.—*Phasmia alpicola*, Zett. ♂ (Murmansk), *Helina borealis*, Zett. ♀, *Lasiops* ? *subrostratus*, Zett. ♀, *Acroptera* sp. ♀, *Delia* sp. ♀ (Murmansk), *Egle* sp. near *parva* ♂ (Murmansk), *Fucellia fucorum*, Fln. ♀ (Murmansk). CORDYLURIDAE.—*Scatophaga villipes*, Zett. ♀ (Murmansk), *S. squalida*, Mg. ♀, *S. litorea*, Fln. ♀. HELOMYZIDAE.—*Leria serrata*, L. ♀ (Murmansk), *L. septentrionalis*, Collin, ♀ (Murmansk), *Tephrochlamys rufiventris*, Mg. ♀ (Murmansk). PIOPHILIDAE.—*Piophilula vulgaris*, Fln. ♀ (Murmansk). EPHYDRIDAE.—*Hydrellia griseola*, Fln. ♂.

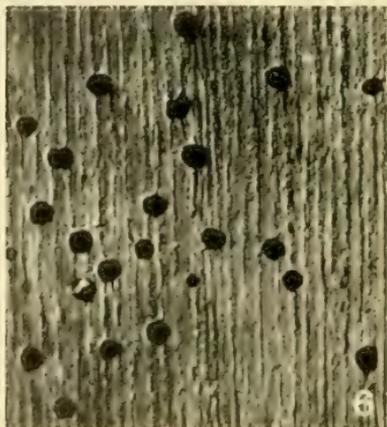
#### FLORA OF YUKANSKI (determined by A. J. Wilmott).

(The specimens are preserved in the Natural History Museum.)

*Trollius europaeus*, L., *Ranunculus acris*, L. f. *borealis*, *R. hyperboreus*, Rottb., *Caltha palustris*, L., *Cardamine pratensis*, L., *Cochlearia* cf. *arctica*, Schlecht. ex D.C., *Capsella bursa-pastoris* (L.) Medek., *Viola epipsila*, Ledeb., *V. biflora*, L., *Parnassia palustris*, L., *Lychnis alpina*, L., *Silene acaulis*, L., *Dianthus superbus*, L., *Cerastium vulgatum*, L. (*triviale*, Lk.), *C. arvense*, L., *Stellaria media*, Vill., *S. crassifolia*, Ehrh., *Honkeneya peplodes*, Ehrh., *Geranium sylvaticum*, L., *Astragalus alpinus*, L., *Phaca frigida*, L., *Oxytropis campestris* var. *sordida*, Willd., *Hedysarum obscurum*, L., *Spiraea ulmaria*, L., *Rubus saxatilis*, L., *R. arcticus*, L., *R. chamaemorus*, L., *Comarum palustris*, L., *Potentilla anserina*, L., *Sibbaldia procumbens*, L., *Geum rivale*, L., *Alchemilla murbeckiana*, Buser, *Pyrus aucuparia*, Gaertn., *Epilobium angustifolium*, L., *E. palustre*, L., *Hippuris vulgaris*, L., *Sedum rhodiola*, L., *Saxifraga caespitosa*, L., *S. rivularis*, L., *S.*

*stellaris*, L., *Archangelica officinalis*, Hoffm., *Haloscias scoticum* (L.) Fr., *Conioselinum fischeri*, Wimm. & Gr., *Cornus suecica*, L., *Linnaea borealis*, L., *Galium boreale*, L., *Senecio alpina* (L.) Fries., *S. nemorensis*, L., *Achillea millefolium*, L., *Chrysanthemum arcticum*, L., *Pyrethrum bipinnatum* (L.), Willd., *Matricaria inodora*, L., *Gnaphalium norvegicum*, Gunn., *Antennaria dioica* (L.), Gaertn., *Solidago virgaurea*, L., *Cirsium heterophyllum* (L.), All., *Saussurea alpina* (L.), D.C., *Taraxacum* cf. *lapponicum*, Kehl., *Hieracium vulgatum*, Fr., *H. alpinum*, L., *Campanula rotundifolia*, L. v. *speciosa*, *Vaccinium myrtillus*, L., *V. uliginosum*, L., *V. vitis-idaea*, L., *Arctostaphylos alpina* (L.), Spreng, *A. uva-ursi*, (L.), Spreng., *Andromeda polifolia*, L., *Phyllodoce caerulea*, Bab., *Loiseleuria procumbens*, Desv., *Sedum palustre*, L., *Pirola minor*, L., *P. secunda*, L., *Diapensia lapponica*, L., *Myosotis alpestris*, Schm., *Mertensia maritima* (L.), S. F. Gray, *Veronica longifolia*, L., *Bartsia alpina*, L., *Euphrasia officinalis*, L., *Pedicularis lapponica*, L., *P. verticillata*, L., *Melampyrum sylvaticum*, L., *M. pratense*, L., *Primula farinosa*, L., *Pinguicula alpina*, L., *Trientalis europaea*, L., *Chenopodium album*, L., *Rumex aquaticus*, L., *R. acetosa*, L., *Polygonum viviparum*, L., *P. aviculare*, L., *Empetrum* cf. *hermaphroditicum* (Lge.), Hagerup, *Urtica dioica*, L., *Alnus incana*, L., *Betula nana*, L., *B. alba*, L., *Populus tremula*, L., *Salix rotundifolia*, Trautv., *S. podaris*, Wabl., *S. glauca*, L., *S. lanata*, L., *Juniperus communis*, L. f. *nana*, Wild., *Veratrum album*, L., *Allium schoenoprasum*, L., var. *sibiricum* (L.), Garcke, *Sparganium hyperboreum*, Laest., *Eriophorum angustifolium*, Roth., *E. vaginatum*, L., *Carex rariflora*, (Wabl.), Sm., *Hierochloa alpina* (Lilj.), Roem., *Poa alpina*, L., *Asplenium crenatum*, Rubr., *Polypodium dryopteris* (L.), Fée., *Lycopodium complanatum*, L., *L. alpinum*, L., *L. annotinum*, L., *Equisetum arvense*, L., *E. pratense*, L.





EXPLANATION OF PLATE VIII.

XESTOBIUM RUFOVILLOSUM, DE GEER.

- Fig. 1. Eggs  $\times 26$ .  
Fig. 2. Eggs, hatching,  $\times 18$ .  
Fig. 3. Larva, full-grown,  $\times 6$ .  
Fig. 4. Pupa in cell,  $\times 5$ .  
Fig. 5. Adult,  $\times 5$ .  
Fig. 6. Emergence holes, natural size.



## Notes on the Life-History of the Death Watch Beetle.

*Plate VIII.*

By D. E. KIMMINS.—*Read 14th December, 1933.*

I hope you have not come here to-night in the expectation of hearing how to combat the Death Watch Beetle, as in my work on this insect whilst I was an assistant to the late Professor H. M. Lefroy, I was concerned solely with its life-history. The material for the experiments was obtained from the floor of Knapton Church, in Norfolk. This floor was composed of oak blocks, and when it was found to be infested with Death Watch Beetles, it was presented to Professor Lefroy to enable him to continue his research on insecticides to be used against this pest. In his paper read before the Royal Society of Arts in 1924, he stated that further knowledge of the habits of the beetle was desirable to enable control measures to be applied more effectively, and this work was undertaken at his request and under his supervision. The untimely death of Professor Lefroy, together with the pressure of other entomological work, brought my experiments to an end, but I hope that such results as were obtained may be of assistance to others working on the problem from an economic point of view.

The Death Watch Beetle (*Xestobium rufovillosum*, De Geer), belongs to the family *Anobiidae*, and is, in the larval state, a borer of dead wood and of structural timber. It has been recorded from oak, chestnut, willow, beech, hawthorn and ash in the open, and indoors in structural oak and chestnut, and on several occasions, pine has been damaged when it has been fastened against oak. The burrows have also been found in old books, into which the larvae had tunnelled from old oak book cases. It is a frequent cause of damage to the roofs of old buildings.

It has been my experience that the larvae of *Xestobium* do not attack freshly seasoned oak, for although numerous eggs were laid in or on new oak, and in other cases first instar larvae were introduced into cracks in such wood, investigation eighteen months later failed to reveal either larvae or any traces of such. Whether this immunity is due to the absence of fungoid growths, or to too great a content of moisture, or to some other cause, I cannot say, but it is significant that not a single larva succeeded in establishing itself in new oak.

Fowler "British Coleoptera," Vol. IV., gives the following description of the adult, pl. VIII. f. 5 :—"A large and conspicuous species, convex, subcylindrical, of a dark chocolate brown colour, thickly tessellated with patches of yellowish pubescence, which gives the upper surface a variegated appearance; the upper surface is finely and thickly scabrous; head rather deeply sunk in thorax; eyes moderately large, convex; antennae reddish, rather short and stout; thorax about as broad as elytra, contracted in front and posterior margin produced, central furrow obsolete; scutellum semi-circular; elytra parallel-sided, with traces of raised lines; legs ferruginous, stout and robust, tarsi short and broad, with fifth joint transverse." The length of the beetle ranges from five to seven millimetres. It may be distinguished from all our other Anobiina by the absence of striae on the elytra, and from *Ernobius* by its stouter tibiae and the broader fifth joint of the tarsus.

The beetles are most active during the night, and are, as a rule, sluggish during the day; in warm weather, however, they are much more active. They walk rapidly, but, although they possess well developed wings, they appear to use them but little for flight. The writer has had many live beetles under observation, but he has never seen one in flight. On one occasion, however, Professor Lefroy was watching some beetles when one of them suddenly spread out its wings and flew rapidly away. The more common use to which the wings are put is that of enabling the insect to regain its feet when it has fallen on its back. When disturbed, as with many other insects, they feign death and fall to the ground.

The tapping of the beetle, from which it obtained its popular name, is heard during late March, April and May, prior to copulation. It is produced at any time of the day; the number and frequency of the taps varies with the temperature, being greater in hot weather. The sound is made by the beetle raising itself on its legs, and then jerking itself forwards and downwards so that the mandibles come into sharp contact with the wood; the sequence of the taps varies from four to eight, and is repeated at short intervals. Its purpose is almost certainly a sex-call, although, as far as the writer was able to ascertain, it was emitted impartially by both sexes. At times, a number of beetles would simultaneously respond to one individual for a period of several minutes, subsequently on many occasions going in search of it.

The adults, which transform from the pupal state in July and August, emerge from the wood in the following spring and early summer; in the open, they do not appear until about late April or May, but in houses, the writer has taken them as early as 24th March. The normal life of the beetle after leaving its pupal cell, is about three weeks in the female and a fortnight in the male. Under laboratory conditions figures were obtained showing that the life of the male varied from eleven to fifteen days, with an average

of fourteen, while the other sex lives for from thirteen to twenty seven days, with an average of twenty one. At a colder temperature, the life would probably be a little longer in the open. The life of the insect appears to be lengthened when the process of copulation is omitted. Dr. Gaban records the case of a virgin female, taken in March, 1917, which lived for ten weeks and responded to tapping through that period. Five to eleven days elapse between pairing and egg-laying.

The egg (fig. 1) is white in colour, finely and evenly granulate and about 0.5mm. long by 0.25mm. broad, although the shape varies according to the situation in which the egg is laid, being flatter when the egg is laid in a crevice of the wood. The total number of eggs laid under observation by one female ranged from eight to eighty-one; the maximum of eighty-one was recorded in 1924, when a female laid that number in nineteen days. The eggs are laid during the night in cracks in the wood, often as deep as one-tenth of an inch, or openly on the surface. The length of the egg stage varies from twenty-two to thirty days.

When the larva is fully developed and ready to emerge, it can be seen dimly through the shell, moving about and apparently scraping at the inner surface of the egg shell with its mandibles. It makes its emergence by eating or biting a hole in the shell (fig. 2); there seems to be no fixed point of emergence, since larvae were observed to leave the egg, sometimes from the top, sometimes from the side and sometimes from beneath. The remainder of the shell is not eaten as the first meal. From these two facts it would seem probable that the egg, in a state of nature, is laid in a crack in the wood, so that the larvae, on emergence, can bore into the wood in almost any direction. On several occasions a hole in the shell was begun, then abandoned for no apparent reason, and a fresh one commenced.

Larvae that emerged from eggs laid openly on the surface wandered actively about, searching for a convenient crack by means of which to enter the wood. They do not seem to be capable of starting a burrow without the primary aid of a crevice.

The first instar larva is about 1mm. in length, white, moderately yellow-haired, dull, with the skin finely roughened. The head is pale yellow in colour, growing darker towards the mouth, and of a very glassy appearance. There are two dark eye-spots on the sides of the head; the hairs of the head point forwards, while those on the body segments are recurved. The legs are short, white and shining. The method of commencing a burrow is as follows:—The larva proceeds into the slit as far as it can and then curves forward the anal segments, so as to get a good grip of the sides with the spinules on the surface of its body. By means of the leverage thus obtained it is able to attack the wood with its mandibles, cutting off chips, and either eating them, or passing them down beneath it by means of its legs. The tunnel is kept fairly cylindrical

by the revolution of the grub on its longitudinal axis as it attacks the wood. The grub can not only move forwards and backwards in the burrow, but can also double on itself and face in the opposite direction.

I have not been able to determine the number of instars nor the period of larval life, but although the latter has not been definitely ascertained, it probably lasts at least three years. Many larvae taken at the same time seemed to fall into roughly three groups, *i.e.*, one-year old, two-year old, and three-year old, or full grown larvae, but on the other hand, it was not found possible to define the limits of these groups. It seems very likely, moreover, that the period of larval life varies with the conditions obtaining in the wood, becoming longer when the wood is older or drier. It has been stated by Dr. Gahan that such is the case in the allied species *Anobium punctatum*, De Geer.

The full-grown larva, fig. 3, is about 10mm. in length, creamy white in colour, and sparsely clothed with fine reddish white hairs. The head is cream-coloured with pitchy black mandibles. Spinules are present on the prescutal folds of the metathorax and of the first six abdominal segments, and on the sides of the ninth. One pair of spiracles is found on the posterior margin of the prothoracic scutellar fold, and on the anterior margin of the scutellar fold of each of the first eight abdominal segments. The legs are weak and are five-jointed, bearing fine hairs and a single terminal claw. As in the earlier stages, the spinules are the chief means of locomotion when the larva is in a burrow.

Normally the direction of the larval burrows is along the grain of the wood, between the harder rings, but in the knotty parts and in much tunnelled wood, it is, of course, far less straight. The diameter of the burrow made by the full-grown larva is about four millimetres. One of the most characteristic features of the working of *Xestobium rufopillosum* is the shape of the pellets of frass; these are lenticular, flattish, and may be as much as one millimetre in diameter. When the grub is full grown an interesting change of habit takes place. Hitherto it has been tunnelling deep in the wood; it now abruptly changes the direction of the burrow, and bores across the grain towards the surface. It does not break through, but leaves a slight partition about one millimetre in thickness; it then proceeds to enlarge the larval burrow and to smooth the walls to form a pupal chamber, fig. 4. The debris from the walls is compressed into a concave partition at the inner end of the cavity. I was not able to observe the formation of this wall and ascertain whether the compression is performed with the aid of any secretion from the Malpighian tubules, as occurs in some *Curculionidae* and *Cerambycidae*. Moll states that the pupal chamber lies parallel to the surface of the wood, but in my experience such is rarely the case and it is usually perpendicular to the surface.

The probable length of the pupal stage is about three weeks, but I was unable to determine it exactly since all my experiments were rendered useless by an outbreak of *Pediculoides ventricosus*, Newport, a Tarsonemid mite which is predaceous on many insects, although not previously recorded on *Xestobium*. The pupa is white, shining, and its length varies from five to seven millimetres. As the pupa becomes more mature, it gradually darkens to a yellow-brown colour, with darker eye-spots. The transformation from the pupa takes place in July or early August, but the imago does not leave the wood until the following spring. Both the larval and pupal exuviae are deposited at the inner end of the pupal chamber. The freshly transformed adult is pale cream in colour, with the head, prothorax and scutellum tinged with brown, and covered with dark brown and golden hairs. The elytra are creamy white, covered with patches of black and yellow hairs.

Under laboratory conditions, emergence from the wood takes place at almost any hour of the day. In making an exit, the beetle gnaws at the thin wooden partition separating it from the open until it has pierced it, and then sets to work to enlarge the hole. During this process, which lasts several hours, the beetle adopts a very curious position. The head is twisted sideways in such a manner that one side of the face becomes hidden in the thoracic foramen, while on the other side is seen the tightly stretched cervical membrane. In this position the beetle is able to use its mandibles one on each side of the wooden partition. Whilst thus engaged the beetle revolves in its cell and scrapes at the inner surface of the partition only, the outer surface becoming quite polished in a ring round the hole by the rubbing of the other mandible. At first only the mandible can be seen but gradually the hole is enlarged and then the head, and finally the whole beetle emerges, liberally covered with wood dust and debris. The work of forcing an exit appears to tax severely the strength of the beetle, as frequent rests are taken, and some cases have been found in which the beetle has altogether failed to emerge. Nevertheless, at Llandaff Cathedral, holes have been bored through nearly one-eighth of an inch of lead roofing, although in this case the greater part of the boring was probably performed by the larva.

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## CORRECTIONS—

p. 116, for "Drepanidae" read  
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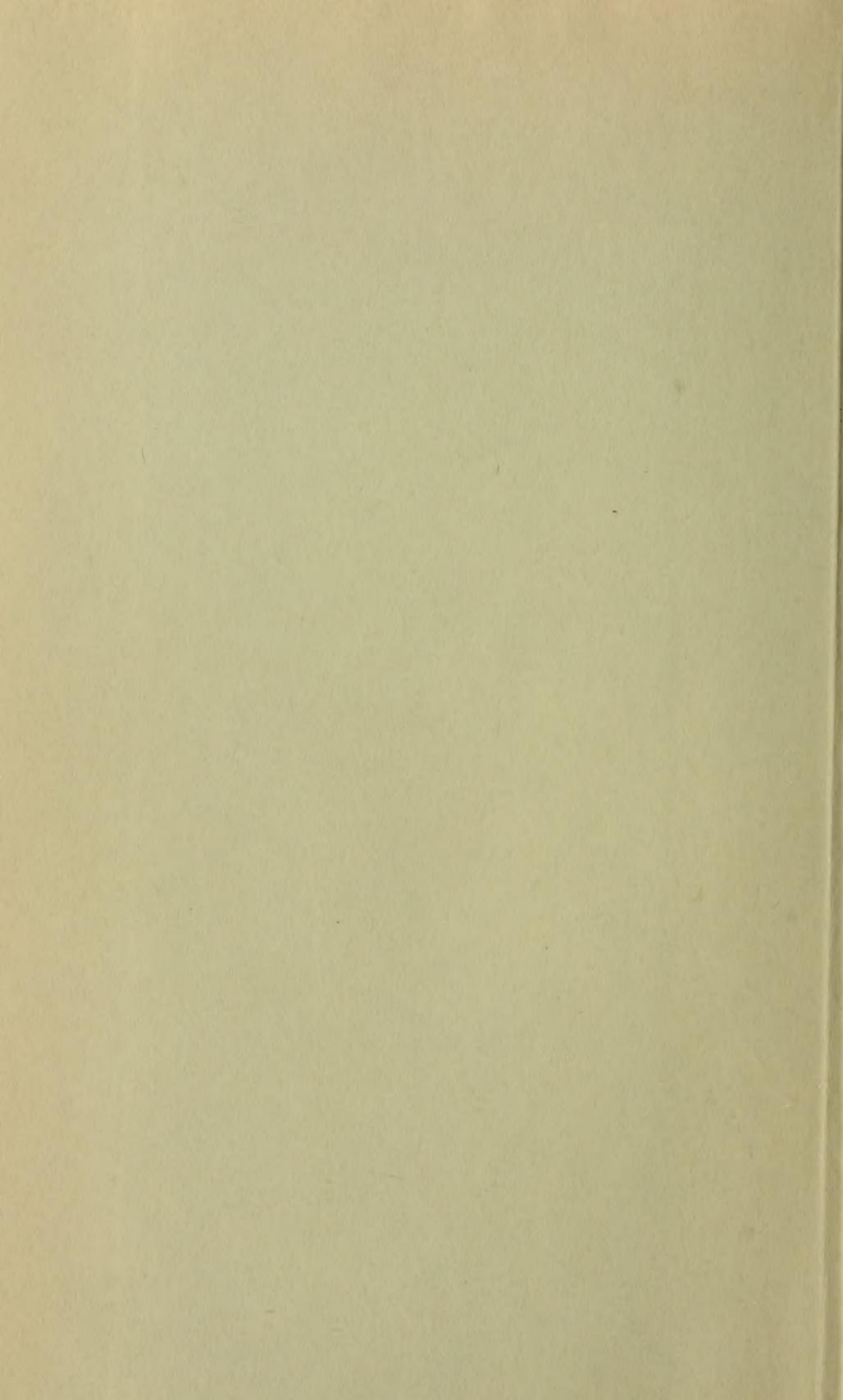
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